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HISTORICAL INCIDENTS OF EXTREME OVERCROWDING

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ABSTRACT

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A review was made of readily accessible documents on a variety of historical incidents which involved groups of people living in varying degrees of intensely crowded circumstances. The primary orientation of the review was to gain knowledge of possible hazards to life and health under conditions of overcrowding that might occur in civil defense shelters. This literature was regarded as a possibly valuable supplement to experimental data bearing on the limits of tolerable crowding. Various types of historical incidents have produced degrees of crowding--along with associated noxious and deprivational circumstances--far more severe and of longer duration than has been or can be subject to experimental test. Conditions beyond those ordinarily accepted as the limits of human tolerance have been withstood on many occasions by large proportions of the victims of certain catastrophic occurrences. In a number of other circumstances, including some involving only moderately intense crowding, very high death and impairment rates have been present. Physical crowding, per se, is not regarded as a fruitful unitary concept for examining the differences between high and low casualty events. For most of the range of densities, physical crowding has significance only in interdependent relationship with many other variable features

of the entire situation, including environmental, structural, temporal, psychological, and social features. The acts of oppressive captors and epidemic disease were the most frequent direct causes of high fatality in the incidents reviewed. Similarly, refinement of definition is required for considering the sociological aspects of overcrowding. Among the types of events from which illustrative material is reported are:

Civil Defense Sheltering: British Shelters in World War II

Civil Prisons

Concentration Camps

Convict Resettlement

Coolie Trade

Crowded Slum Housing

Displaced Persons Camps

Emigrant Ships

Israeli Migration

Melina (Jewish Underground Hiding Places, World War II)

Mental Hospitals

Natural Disasters

Prisoners of War

Relocation of Japanese-Americans

Shelter Occupancy

Shipwrecks

Sieges

Slave Trade

Troop Transport

Wartime Urban Evacuation

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1. Purpose and Scope of the Study

The work of the present study was a review of a broad selection of historical reports on situations characterized by unusually high degrees of crowding. The central problem posed by the requirement for the study was that ". . . of determining how densely [civil defense] shelters may be loaded before the hazards to the occupants become comparable to those that caused the taking of shelter." Gross assumptions about the possible nature of postattack shelter-taking provided criteria of relevance for selection and emphasis among the various classes of events that could be studied. These assumptions provided an implicit definition of what constitutes "overcrowding." In choosing types of events to study, those characterized by the most extreme densities of occupancy in an enclosed space for extended periods of time were emphasized in the initial work. Situations characterized by less extreme degrees of crowding were increasingly used during the course of the study as further understanding of significant features of "overcrowding" was gained.

A number of recurrent sets of circumstances in history have involved dense crowding of people for periods of time and under conditions variously comparable to possible sheltering conditions. As part of the present study, analyses have been made of crowding in such situations as the slave trade, troop ships, rail and sea transports of prisoners, besieged populations, slum dwellings, internment, concentration and prisoner-of-war camps, and penal institutions.

2. Preliminary Literature Review

At the outset of the study, there was no clear knowledge of how valuable for the purposes of the present study available historical information might be, nor could forecasts be made of the difficulties that might be confronted in the problems of research and analysis. Provision was therefore made in the study plan for a broad, but relatively superficial preliminary review of the literature in a number of seemingly promising fields. This review had the purpose of determining the extent and nature of the useful data contained in available documents and of deciding what further explorations of the historical literature, if any, would be profitable.

Approximately 1,000 works were scanned during this review and among these, about 500 were judged of sufficient relevance to the subject of the study to merit abstracting in whole or part.

The first body of literature surveyed was that dealing with the Middle Passage of the African slave trade. A preliminary report of the findings of this particular review was prepared (Report BSSR: 354-2, May 11, 1962) to illustrate types of information that could be developed from discursive historical discussions and their possible relevance to the shelter problem.

The reviews of the slave trade literature and of works covering a number of other types of experience, were used to develop an Index-Guide (see Appendix G). This Index-Guide served the two-fold purpose of guiding abstracters to pertinent material in the literature and as a method of indexing through a short-hand code the pertinent data they

located. During the more varied and extensive work that has been undertaken subsequently, the Index-Guide has been revised and supplemented.

3. Types of Events

The preliminary review located some useful information in the literature on each of the following types of events:

Civil Defense Sheltering

Civil Prisons

Concentration Camps

Convict Resettlement

Coolie Trade

Crowded Slum Housing

Displaced Persons Camps

Emigrant Ships

Israeli Migrations

Japanese Relocation

Mental Hospitals

Prisoners of War

Shelter Occupancy

Sieges

Slave Trade

Troop Transportation

Wartime Urban Evacuation

Isolated Experimental Data on Confinement and Related Variables

No attempt was made to carry out an exhaustive review of the literature in each area studied. It was found that after the salient

features of the type of event had been identified from a few sources, additional review tended to yield highly repetitive information.

In addition to the types of events listed, some isolated references regarding a number of other episodes were found particularly pertinent.

Appendices A through F to the present report review the relevant information in each of these fields that was located.

4. Variables

The study addressed itself to physiological, environmental, and behavioral variables. It was initially assumed that a large part of the analytic work of the study would involve highly technical interpretations of data bearing on engineering and medical problems. Very few instances were actually encountered in historical data which involved the kinds of detail, precision or complexity requiring or permitting highly technical interpretation. By and large, descriptions and concepts in the relevant material involved everyday, rather than esoteric, language. Difficulties of interpretation of reports required more an understanding of archaic usages than esoteric ones.

As a consequence, the major demand for expertise required for the work of the study was that involved in the bibliographic search process.

5. Pertinence

None of the types of incidents reviewed provides an experience completely pertinent to any foreseen situation of postattack sheltering. Taking as points of comparison between conceivable postattack shelters

and situations that have been reviewed such lists of variables as have been compiled by Rayner (1960) or Biderman (1960), it is possible to represent in one or more of the events each of the general features ascribed to the shelter situation. Those events that have the most points of similarity were selected for study. None of the events surveyed, however, has the entire pattern of characteristics of any posited shelter situation.

In the present review, the presence of severe crowding has been the basis for the selection of episodes and the focus of attention in evaluating them. It is not possible on the basis of this review to factor out the importance of overcrowding from other pertinent variables in the pattern manifested in the events that were studied. The reason for this is that, despite its convenience as a common-sense or an administrative term, "crowding" has very limited usefulness as an independent, scientific variable. Short of the point at which persons are threatened by the physical pressure and postural constraint imposed by too many bodies in a confined space, the significance of crowding is dependent on various interdependent environmental, physiological, psychological and social aspects of the situation.

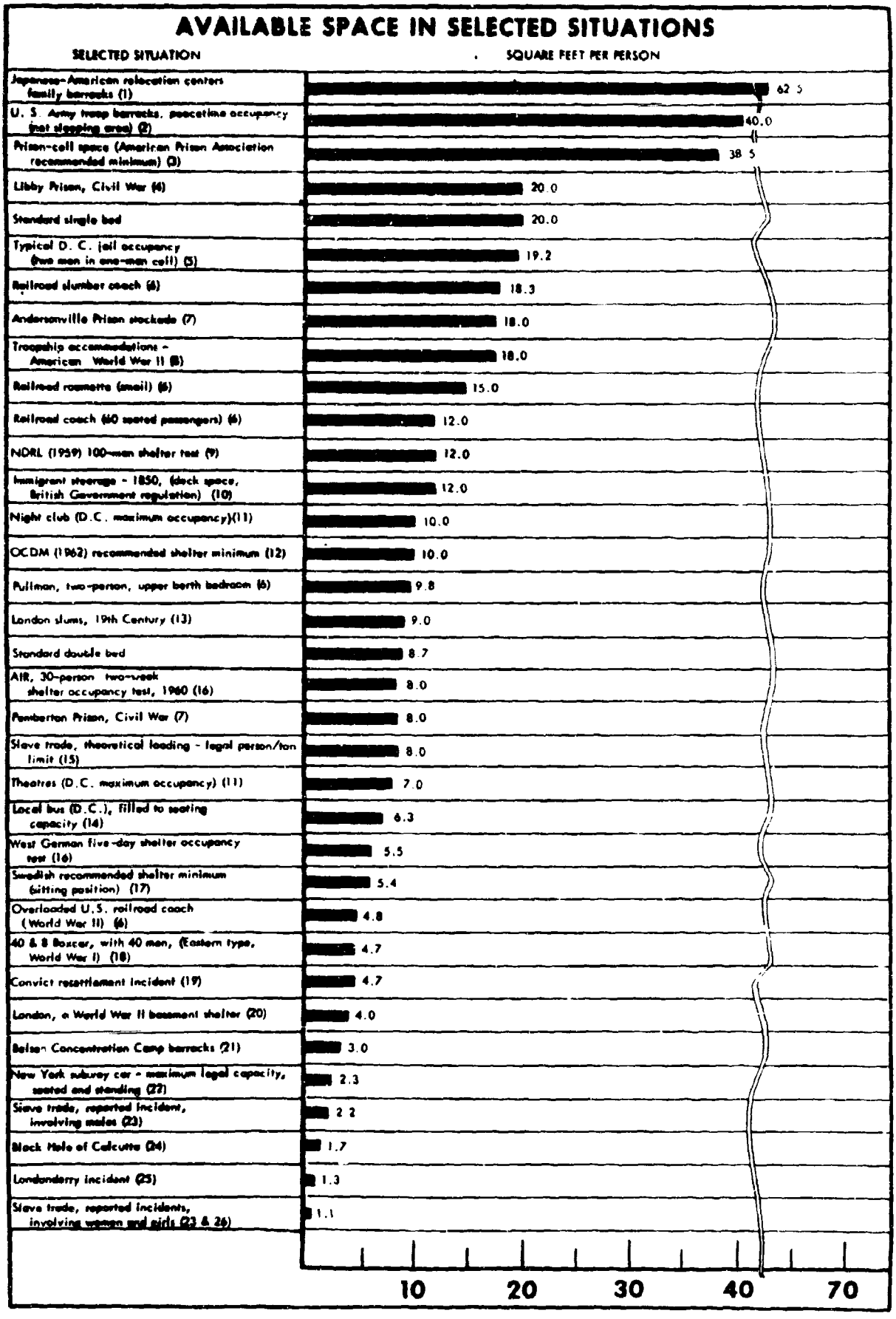
6. How Crowded is Overcrowded

When we speak about how hot or cold an environment is, the specification of a numerical temperature reading provides immediate meaning

references for the reader--his own subjective experience with overly hot and cold environments, extrapolations from his actual experience, knowledge from studies of human physiology, and so on. While square-feet-per-person and cubic-feet-per-person provide ready physical scales of the intensity of crowding, most of us must undertake a mental exercise to relate a given figure of density to a meaningful experiential context. As an aid to appreciating the significance of measures of crowding stated in terms of physical density, a number of situations of common experience and knowledge have been selected as benchmarks to illuminate scales of cubic and superficial density, respectively. Various examples of historical instances of overcrowding that have been reviewed have been placed on the same scales. (See Charts 1 and 2.)

As can be seen from the charts, there are many common situations which are quite tolerable and a few that are ordinarily pleasant in which crowding densities are considerably greater than in other situations in which overcrowding has been the source of catastrophe. The relative brief duration of stays in a crowded night club or elevator and the related matter of the limited range of life needs that must find their realization in these restricted contexts explain differences between some benign and some deadly instances of crowding. Structural characteristics such as those that affect air supply, heat dissipation, and waste disposal and furnishings that affect the efficiency and inefficiency and comfort or discomfort of the stowage of human bodies, also make for major differences.

Chart 1


AVAILABLE SPACE IN SELECTED SITUATIONS
SELECTED SITUATION
SQUARE FEET PER PERSON
Japanese-American relocation centers family barracks (1)
62.5
U. S. Army troop barracks, peacetime occupancy (net sleeping area) (2)
60.0
Prison-cell space (American Prison Association recommended minimum) (3)
38.5
Libby Prison, Civil War (4)
20.0
Standard single bed
20.0
Typical D. C. jail occupancy (two men in one-man cell) (5)
19.2
Railroad slumber coach (6)
18.3
Andersonville Prison stockade (7)
18.0
Troopship accommodations - American World War II (8)
18.0
Railroad roomette (small) (6)
15.0
Railroad coach (60 seated passengers) (6)
12.0
NORL (1959) 100-man shelter test (9)
12.0
Immigrant steerage - 1850, (deck space, British Government regulation) (10)
12.0
Night club (D.C. maximum occupancy)(11)
10.0
OCDM (1962) recommended shelter minimum (12)
10.0
Pullman, two-person, upper berth bedroom (6)
9.8
London slums, 19th Century (13)
9.0
Standard double bed
8.7
AIR, 30-person two-week shelter occupancy test, 1960 (16)
8.0
Pemberton Prison, Civil War (7)
8.0
Slave trade, theoretical loading - legal person/ton limit (15)
8.0
Theatres (D.C. maximum occupancy) (11)
7.0
Local bus (D.C.), filled to seating capacity (14)
6.3
West German five-day shelter occupancy test (16)
5.5
Swedish recommended shelter minimum (sitting position) (17)
5.4
Overloaded U.S. railroad coach (World War II) (6)
4.8
40 & 8 Boxcar, with 40 men, (Eastern type, World War I) (18)
4.7
Convict resettlement incident (19)
4.7
London, a World War II basement shelter (20)
4.0
Belsen Concentration Camp barracks (21)
3.0
New York subway car - maximum legal capacity, seated and standing (22)
2.3
Slave trade, reported incident, involving males (23)
2.2
Black Hole of Calcutta (24)
1.7
Londonderry incident (25)
1.3
Slave trade, reported incidents, involving women and girls (23 & 26)
1.1
10
20
30
40
70

AVAILABLE SPACE IN SELECTED SITUATIONS -

SQUARE FEET PER PERSON

SOURCES

(1) Leighton, A. H. The Governing of Men. Princeton: Princeton University Press, 1945, p. 65.

(2) Headquarters, Department of the Army. Army Regulations, No. 210-16. Washington, D.C.: Government Printing Office, 1959, p. 17.

(3) Information from American Prisons Association, Washington, D.C., 1962.

(4) United States Sanitary Commission. Report on Sufferings of Prisoners of War. Washington, D.C.: Government Printing Office, 1864, p. 31.

(5) Information from District of Columbia, Department of Corrections, Washington, D.C., 1962.

(6) Information from Baltimore and Ohio Railroad Office, Baltimore, Maryland, 1962.

(7) United States Congress, Special Committee on the Treatment of Prisoners of War and Union Citizens, 40th Congress, 3rd Session. Report No. 45. Washington, D.C.: Government Printing Office, 1869, p. 225.

(8) Holliday, Kate. Troopship. New York: Doubleday & Co., 1952, p. 30.

(9) Strope, W. E., Etter, H. S., Goldbeck, R. A., Heiskell, R. H. and Sheard, J. H. Preliminary Report on the Shelter Occupancy Test of 3 December, 1959. San Francisco: U.S. Naval Radiological Defense Laboratory, 1960, p. iii.

(10) Great Britain, House of Commons. Sessional Papers, 1851, Vol. 19, Report from the select committee on passengers' act, p. xxvii.

(11) Information from District of Columbia Government, Office of the Fire Marshal, 1962.

(12) Department of Defense, Office of Civil Defense. Minimum Technical Requirements for Group (Community) Shelters. Tech. Mem. 61-3, Washington, D.C., 1962.

(13) Great Britain, House of Commons. Sessional Papers, 1884-1885, Vol. XXX, First report of Her Majesty's Commissioners on housing of the working classes, preliminary statement, p. 14.

(14) Information from the D. C. Transit System, Inc., Washington, D. C., 1962.

(15) Wilson, J. L. The British Squadron on the Coast of Africa. London, 1851, Diagram of Brookes.

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(17) Brand-Persson, A. "The Shelter Program and Shelter Occupancy Experiments in Sweden." In Human Problems in the Utilization of Fallout Shelters, Publ. 800. Washington, D. C.: National Academy of Sciences - National Research Council, 1960, p. 91.

(18) Information from the American Legion, Washington, D. C., 1962.

(19) The History of the British Convict Ship "Success". n.d., p. 72.

(20) MacNalty, A. S. (Ed.) The Civilian Health and Medical Services. London: H. M. Stationery Office, 1953, p. 194.

(21) Davis, W. A. "Typhus at Belsen." American Journal of Hygiene, 1946, Vol. 46, p. 67.

(22) Information from the Transit Authority, New York City, 1962.

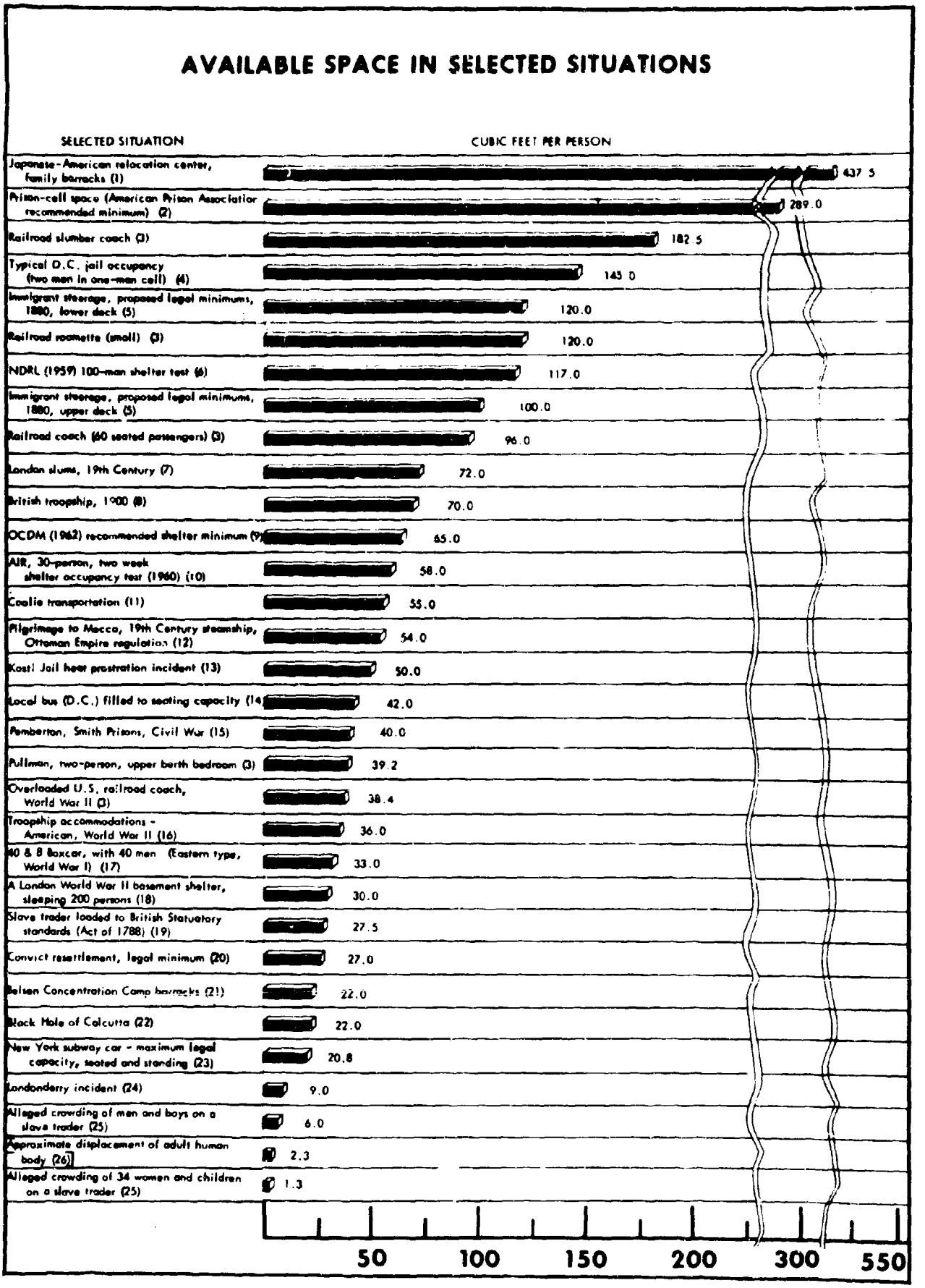
(23) Clark, R. The African Slave Trade. Boston, 1860, p. 27.

(24) Woodruff, P. The Men Who Rule India--I. The Founders. London: Jonathan Cape, 1953, p. 96.

(25) Brasch, J. K. "Ventilation for Human Occupancy - a Disaster of Historic Import." Industrial Medicine and Surgery, 1959, Vol. 28, p. 36.

(26) Religious Society of Friends. A View of the Present State of the African Slave Trade. Philadelphia, 1824, p. 60.

Chart 2


AVAILABLE SPACE IN SELECTED SITUATIONS
SELECTED SITUATION
CUBIC FEET PER PERSON
Japanese-American relocation center, family barracks (1) 437.5
Prison-cell space (American Prison Association recommended minimum) (2) 289.0
Railroad slumber coach (3) 182.5
Typical D.C. jail occupancy (two men in one-man cell) (4) 145.0
Immigrant steerage, proposed legal minimums, 1880, lower deck (5) 120.0
Railroad roomette (small) (3) 120.0
NDRL (1959) 100-man shelter test (6) 117.0
Immigrant steerage, proposed legal minimums, 1880, upper deck (5) 100.0
Railroad coach (60 seated passengers) (3) 96.0
London slums, 19th Century (7) 72.0
British troopship, 1900 (8) 70.0
OCDM (1962) recommended shelter minimum (9) 65.0
AIR, 30-person, two week shelter occupancy test (1960) (10) 58.0
Coolie transportation (11) 55.0
Pilgrimage to Mecca, 19th Century steamship, Ottoman Empire regulation (12) 54.0
Kasti Jail heat prostration incident (13) 50.0
Local bus (D.C.) filled to seating capacity (14) 42.0
Pemberton, Smith Prisons, Civil War (15) 40.0
Pullman, two-person, upper berth bedroom (3) 39.2
Overloaded U.S. railroad coach, World War II (3) 38.4
Troopship accommodations - American, World War II (16) 36.0
40 & 8 Boxcar, with 40 men (Eastern type, World War I) (17) 33.0
A London World War II basement shelter, sleeping 200 persons (18) 30.0
Slave trader loaded to British Statutory standards (Act of 1788) (19) 27.5
Convict resettlement, legal minimum (20) 27.0
Belsen Concentration Camp barracks (21) 22.0
Black Hole of Calcutta (22) 22.0
New York subway car - maximum legal capacity, seated and standing (23) 20.8
Londonderry incident (24) 9.0
Alleged crowding of men and boys on a slave trader (25) 6.0
Approximate displacement of adult human body (26) 2.3
Alleged crowding of 34 women and children on a slave trader (25) 1.3
50
100
150
200
300
550

AVAILABLE SPACE IN SELECTED SITUATIONS -

CUBIC FEET PER PERSON

SOURCES

(1) Leighton, A. H. The Governin of Men. Princeton: Princeton University Press, 1945, p. 65.

(2) Information from American Prisons Association, Washington, D.C., 1962.

(3) Information from Baltimore and Ohio Railroad Office, Baltimore, Maryland, 1962.

(4) Information from District of Columbia Department of Corrections, Washington, D.C., 1962.

(5) Great Britain, House of Commons. Sessional Papers, 1851, Vol. 19. Report from the select committee on passengers' act, p. xxvii.

(6) Strope, W. E., Etter, H. S., Goldbeck, R. A., Heiskell, R. H. and Sheard, J. H. Preliminary Report on the Shelter Occupancy Test of 3 December, 1959. San Francisco: U.S. Naval Radiological Defense Laboratory, 1960, p. iii.

(7) Great Britain, House of Commons. Sessional Papers, 1884-1885, Vol. XXX, First report of Her Majesty's Commissioners on housing of the working classes, preliminary statement, p. 14.

(8) 57th Congress, House of Representatives. Document 537, Transport Service. Washington, D.C.: Government Printing Office, 1901.

(9) Altman, J. W. "Laboratory Research in the Habitability of Public Fallout Shelters." In Human Problems in the Utilization of Fallout Shelters. Washington, D.C.: National Academy of Sciences - National Research Council, 1960, p. 160.

(10) Baker, G. W. and Bauer, Mary L. Fallout Shelters and Human Behavior. Reprinted from Design for the Nuclear Age. Publ. 922. Washington, D.C.: Building Research Institute, National Academy of Sciences - National Research Council, 1960, p. 66.

(11) Turner, T. J. The Hygiene of Emigrant Ships. Boston: Franklin Press; Rand, Avery, & Co., 1881, p. 11.

(12) Turner, T. J. The Hygiene of Emigrant Ships. Boston: Franklin Press; Rand, Avery, & Co., 1881, p. 11.

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(14) Information from D.C Transportation System, Inc., Washington, 1962.

(15) United States Congress, Special Committee on the Treatment of Prisoners of War and Union Citizens, 40th Congress, 3rd Session. Report No 45. Washington, D.C.: Government Printing Office, 1869, p. 225.

(16) Holliday, Kate. Troopship. New York: Doubleday & Co., 1952, p. 30.

(17) Information from the American Legion, Washington, D.C., 1962.

(18) MacNalty, A. S. (Ed.). The Civilian Health and Medical Services. London: H. M. Stationery Office, 1953, p. 194.

(19) Wilson, J. L. The British Squadron on the Coast of Africa. London, 1851, Diagram of Brookes.

(20) The History of the British Convict Ship "Success". n.d., p. 72.

(21) Davis, W. A. "Typhus at Belsen." American Journal of Hygiene, 1946, Vol. 46, p. 67.

(22) Woodruff, P. The Men Who Rule India I. The Founders. London: Jonathan Cape, 1953, p. 96.

(23) Information from the Transit Authority, New York City, 1962.

(24) Brasch, J. K. "Ventilation for Human Occupancy - a Disaster of Historic Import." Industrial Medicine and Surgery, 1959, Vol. 28, p. 36.

(25) Clark, R. The African Slave Trade. Boston, 1860, p. 27.

(26) Based on average human weight of 145 pounds.

Less obvious variables than these are equally involved as determinants in various situations of what constitutes overcrowding. Crowding must be analyzed in terms of the transactions with the environment and with the group that must take place or that in fact do take place in a given situation. It is not the number of people that are together in a given space that is the usual source of distress, but rather the products of their joint activities in that space--the heat they generate, the quarrels they generate, the air they consume, the germs and rumors they spread, etc.

A determinant of these activities in all situations is the factor accounting for crowding in the first place--that is, what it was that led the people involved to be pushed or to push themselves into a severely restricted space. (See Appendix B.) A classification based on the type of need making for a utilization of a restricted space cross-cuts the classification of events in the Index-Guide.

The factors that lead to crowded occupancy differentiate the environment and the activity of the occupants of it.

None of the events that have been studied presented a "pure" case of hardship from crowding alone. Rather, all instances involved some other source of stress. The purest cases studied were a number from sea transportation in which there were fairly satisfactory provisions for ventilation, food, and hygiene--well-designed troopships, for example. (See Appendix F.) Even in these cases, however, problems arising from motion sickness frequently constituted a complicating factor given major attention in the reports.

The central and starting point for the present analysis is physical density of occupancy; our task, then, is to consider the meanings various levels of crowding have for the transactions of people in the crowded situation with their environment and with their fellow occupants. The present study could not attempt definitive treatment of the many stresses that frequently accompany overcrowding such as those from heat, contagious disease, hunger, thirst, or psychological and physical oppression.

7. Radiation vs. Sheltering Hazards

The central question posed for the present study was ". . . how densely may shelters be loaded before the hazards to the occupants become comparable to those that caused the taking of shelter."

In the case of shelter from a lethal level of environmental radiation, the answer, of course, is clear, since the sheltering hazard cannot exceed the radiation hazard. Further, almost any level of crowding that takes place naturally among persons seeking refuge will not approach such a hazard.

The problem is considerably more complex when one considers the question of how long should persons remain in a hazardously overcrowded shelter as levels of ratiation outside the shelter attenuate from lethal levels. Although, obviously, no general answer can be given to this question, some knowledge acquired in the course of this review bears on it.

There are frequent historical instances in which large groups of people have been forced to endure conditions of crowding over extended periods of time that were far more severe than those currently subject to experimental research in support of shelter planning. Losses in such

circumstances have sometimes been exceedingly heavy--occasionally near 100 per cent as in some "black hole" cases or the ravaging of the crews of ships by [illegible]. Somewhat more frequently, however, deaths were near the normal range and little detectable permanent impairment appears to have occurred. The most frequent type of case among the extreme episodes that have been surveyed was characterized by some elevation of death and morbidity incidence above the normal levels for the populations involved.

It is clear that in many instances, available space has been far below ten square feet per person, fresh air below three cubic feet per minute per person, effective temperatures have been far higher than 85° F, facilities for waste disposal primitive or nonexistent, bathing or laundry impossible; yet all or a large proportion of those interned survived the experience.

Most of the cases where mortalities were very high (30 per cent or more) were characterized by one or a combination of the following:

a. Those interned suffered from unnatural hardships by human oppressors who were either completely indifferent to their survival or who placed a negative value on their survival (e.g., concentration camp inmates and some POW's; convict transports).

b. Internees were ravaged by epidemic.

In none of the instances surveyed did persons seeking refuge or transportation voluntarily crowd themselves so densely into a space as to produce high casualties from inadequate ventilation or excessive heat.

The exceptions to this are accidents, such as the Bethnal Green air-raid shelter pile-up, or the entombment of shelter-takers by the collapse of structures in air raids. On the basis of the survey, it would seem that only under most unusual circumstances of mob pressure on the entrances would any structure with furnishings, pillars, corridor bends, or other encumbrances forming pressure barriers against linear crowd movement fill up in an unplanned, uncoerced fashion to degrees of human cubic density equivalent to that, for example, of the decks of slave or prison ships. To achieve the degree of crowding achieved by slave traders took careful and deliberate planning of how all available space, including vertical space, could be used, and the forcible arrangement of the bodies of the persons "stowed" in such patterns as maximally filled the horizontal surfaces. These surfaces had been arranged, in turn, for maximum "stowage." It is difficult to conceive of how an unorganized group could fill up any space as densely, except a panicked mob fleeing into an unencumbered 5'6" high tunnel through an opening at the end.

The following passage indicates the kind of force required to achieve loading to the limits reached in a number of the episodes studied. The first describes a Japanese ship carrying Americans from the Philippines to Japan:

> Together we. . .began working our way down into the hold. When it was nearly full, guards came down and with whips began beating us farther back into the hold until it looked as if no more men could get in. Surely they could put no more men down. Yet more and more were coming. The ceilings were low, only about five feet high, but we were made to stand. We were packed, hunched down, until within two hours they had put more than six hundred men in an area not large enough to hold a hundred (Stewart, 1961, p. 116).

Another example is given by an autobiographical account written by a Korean lieutenant who was captured in Korea:

> As the. . .war was getting worse for the United Nation, we left Inchon (in December). It was the last evacuation ship. . . . If any cameraman filmed what had happened during this voyage of 38 hours from Inchon to Pusan, even Satan would be indignant at seeing it. . . . In a cargo ship the tonnage of which was estimated at 3,000 tons at the most, 4,500 PW's were shipped. The cause of death of over half of the dead was being trampled down under foot.
>
> When two thirds of the PW's (had been) put in the ship, the room of the ship was jammed with people. GI guards pushed them . . . (further in) but they found it of no use, and they stabbed the men around them with jackknives. . . . I heard the piercing voice of the first prey. He fell on his face. Innumerable people stepped on him. People found a nice place on his body to sit on. Brutality governed all. I could hear nothing in the clamor. . . (quoted in Meyers & Bradbury, 1958, pp. 54-55).

8. Acute Crowding Disasters

There is a special interest in the few cases of acute crowding disasters which were examined. The popular prototype of these is the Black Hole of Calcutta (Woodruff, 1954). A number of such instances characterized by high casualties (30 to 100 per cent) that resulted directly from consequences of overcrowding were studied. In each of these cases, casualties resulted both from direct effects of crowding and from a violent struggle within the group which took place as the cries for release from confinement of those interned went unheeded. These acute disasters occurred within the space of several hours, although sometimes they occurred when ventilation was shut off from a group that had previously been in the enclosure for a long period of time.

Despite the apparent similarity of the behavioral descriptions in many of these events, there are two major classes of them that can be distinguished: the "high-ceiling" enclosures such as Kosti and the Black Hole of Calcutta, where deaths resulted from the effects of heat; and the "low-ceiling" enclosures, such as that of the Londonderry incident, where suffocation was a contributing cause.

The following selections illustrate these acute crowding disasters. Stewart, quoted immediately above, a survivor of World War II Japanese prisoner-of-war camps, describes what took place in the hold of a converted Japanese luxury liner carrying 600 survivors of the Philippine camps to Japan.

> We were crammed so tightly that if a man fainted he could not fall to the floor. He would be packed between the men around him. . . .
>
> Surely after they put out to sea they could let us on the decks of the ship, let us have air. Gradually the air was becoming foul. It was getting hard to breathe, and there was only a small air hole, a small hatch opening. I started to sweat and I could feel the water draining out of me. I was dying for a drink of water. . . .
>
> It was getting hotter and hotter. The hold was now an inferno. Men began to cry, begging for water. Cries for water went up all over the hold. A Jap guard appeared at the hatch above our heads and shouted down into the hold.
>
> "If you are not quiet, we will close the hatch cover. We will tighten down the hatches and you will have no air."
>
> Panic struck each man. We were suffocating, but what would happen if they shut off all the air? Only a matter of minutes and we would be dead.
>
> It was late in the afternoon, nearly five o'clock.

> I thought I could hear the noises of the ship starting up and the huge engines drumming. Then I saw the movement of light shadows cast down in the hold. I knew that we had started across the bay. The prisoners were screaming, crying for air and begging for water. . . .
>
> I did not know how long we had been down in the hold. But I could see that it was darker, so that it was surely night. The men began screaming and fighting. They tore at each other, they fought and pushed. Their screams of terror and their laughter were terrible things.
>
> Suddenly there was more room. The fainting and the dead were sliding down until men littered the floor underneath our feet. We had more room to move in. But under our feet were the bodies of men.
>
> . . . The men fought on. The dizziness came back to me again, the feeling of being sucked under, sucked down. I felt myself losing consciousness. . . .
>
> I heard strange noises. Men were choking each other. Then the awful truth dawned on me as I looked at a body lying beneath me on the floor. His throat had been cut and the blood was being drunk.
>
> . . . A few feet away I saw two men grappling. In the gloom I recognized who they were. They were father and son. I remembered how they had protected and cared for each other in the years past. They were both West Point graduates. The son was killing his father (Stewart, 1961, pp. 116-120).

Stewart's memoir provides another significant feature of interest to the problem of overloaded shelters in relation to a deadly environment. The prisoners he describes endured an entire night of heat, suffocation, painful posture, extreme thirst, and physical pressure from the seething mass of bodies in the hold. Many of them, according to his account, were driven to mad, mutual slaughter. During this entire night, the Americans made no attempt to rush out of the hold and overpower

the Japanese guards or to tear off the hatch covers that were stifling the men below. At daybreak, however, the ship was attacked by Allied planes. During the strafing and bombing, word spread through the men that the ship was sinking. At this point, a concerted movement to escape did take place. Now there was a conscious fear of being "trapped" and there was a concerted swarming above decks; the guards were overpowered amidst the strafing; and the survivors leaped into the sea to swim to the nearby shore (Stewart, 1961, 121 ff.).

The example just given took place in a low-ceilinged hold of a ship. Heat effects, as well as possible suffocation, were the original source of stress. These were doubtless compounded by the agitated state of the men. They had just been evacuated from the Philippines, which were under American attack. They had been excited by the prospect of liberation. Agitation and heat from the crowded masses of prisoners in the hold spiraled in the melee that ensued.

Similar effects can occur in "high-ceiling" acute crowding in a hot environment where suffocation presumably is not a crucial factor. The Kosti incident illustrates such an event.

> On Tuesday, February 21st, 1956, 281 tenants were arrested by the police from the hawashat and villages of Goda Irrigation Scheme 90 miles south of Kosti town. These people were hurried in lorries in the middle of the day from Goda to Kosti where they were confined in a newly-built ward 19 metres long by 5.5 metres wide by 3.8 metres high with a cement floor. The ward has 16 windows each 1.33 metres high by one metre wide. The windows are made of timber except the top 10 centimetres which are of glass. The windows were tightly shut. The ward also has two doors of timber, each 2.05 metres by 1.5 metres, but they were also closed. The roof

> of the ward is of the Gamalon type, and is made of corrugated iron sheets with Cellotex ceilings. The walls are made of red bricks. This was one of a number of newly erected wards which were intended to serve as barracks for the Sudan Defence Force. Under normal circumstances, a ward of such dimensions is allotted to 16 soldiers.
>
> The Meterological Department at Kosti recorded the following figures on the night of February 21st-22nd, 1956:
>
> Maximum temperature - 103.8°F
> Minimum temperature - 69.6°F
> Relative humidity - 19% at 8 p.m.
> 48% at 11 p.m.
> 60% at 2 a.m.
> 47% at 5 a.m.
>
> The tenants were locked up in the ward at about 7:30 p.m. after an exhausting eight-hour journey in lorries. They probably had very little to eat and drink during the previous 24 hours. On opening the ward in the morning 187 persons were found dead, and 11 persons were seriously ill with shock, thready pulse and vomiting. The other inmates were in a better condition. The 11 sick persons were carried to Kosti Civil Hospital; two of them died on the way and of the remaining nine, five died on the day of admission. All the nine cases in hospital were suffering from heat hyperpyrexia with an average temperature of 102°F, thready pulse, sunken eyes, dry lips, dry wrinkled skins, and sighing respiration, and were either comatose, or semi-comatose and in a state of muttering delirium (Haseeb and Amin, 1958, p. 280).

An incident from the history of immigration, on the other hand, gives an illustration of somewhat similar results arising in a comparatively cool environment, but one of highly limited and effectively sealed cubic space. Suffocation, rather than heat prostration, was the apparent cause of distress and deaths in this case:

> The steamer Londonderry left Sligo (Ireland) on Friday, December 1, 1848, for Liverpool (England) with 150 to 190 passengers on board. All except

> three were steerage passengers and most were emigrants on their way to America (by means of a different ship from Liverpool). During the voyage, the ship encountered a storm so severe that the captain ordered all of the steerage passengers below and into the steerage cabin which was only about 18 feet in length, 10 to 12 feet in width, and seven feet high. Into this cabin perhaps 150 persons were crowded. . . . Then, with apparent fear that water would enter the companion, it was closed and a tarpaulin nailed over it. The companion was the only opening to the steerage cabin to serve as a vent, and when this was closed there was no opening whatever for air to enter. There followed, as reported by survivors, a period of agony and horror in which the inmates shrieked for aid. But with the raging storm in progress, and the crew busily engaged in keeping the ship under control, the cries were either not heard or given no attention. Finally, one man managed to break an opening in the tarpaulin of the companion and force himself out. He notified the mate who became instantly alarmed. Then, carrying a lantern, the mate went down to render assistance. But on entering the cabin, the light was immediately extinguished. A second was obtained, but this too was extinguished. Finally, when the tarpaulin was completely removed, fresh air entered the cabin, and the awful sight of the living, the dying and the dead was disclosed.
>
> . . . Seventy-two persons were dead; the bodies in the steerage cabin were piled four deep over one other. Each corpse presented the appearance of death by suffocation; many were blackened, others covered with blood from mouth and nose, and from wounds caused by trampling and violence in the frantic struggle for escape (Brasch, 1959, p. 36).

In evaluating incidents such as the Kosti and Black Hole cases, it is notable that crowding, in terms of available square feet per person was considerably more extreme in prison and slave ships. The planned crowding in the latter also made effective use of the vertical dimension.

Shelves, racks, bunks and platforms, as well as specially designed craft which had decks of less than five feet in height, accomplished this. The significance of cubic density as a measure of overcrowding depends heavily on such structural features.

As in the Black Hole of Calcutta, the Kosti case represents an extreme of crowding only with respect to the amount of surface area available per person. This incident falls fairly high on Chart 2, showing the amount of cubic space per person available. The Londonderry suffocation incident, on the other hand, represented acute crowding both of the horizontal and vertical dimensions. The same is true of several incidents in the literature on the Middle Passage of the slave trade, of which the following description is illustrative.

> They had on one occasion, taken a slave vessel in the river Bonny; the slaves were stowed in the narrow space between decks, and chained together. They heard a horrid din and tumult among them, and could not imagine from what cause it proceeded. They opened the hatches and turned them on deck. They were manacled together, in twos and threes. Their horror may be well conceived, when they found a number of them in different stages of suffocation; many of them were foaming at the mouth, and in the last agonies, - many were dead. The tumult they had heard, was the frenzy of those suffocating wretches in the last stages of fury and desperation, struggling to extricate themselves. When they were all dragged up, nineteen were irrecovably dead. Many destroyed one another, in the hopes of procuring room to breathe; men strangled those next to them, and women drove nails into each other's brains. Many unfortunate creatures, on other occasions, took the first opportunity of leaping overboard, and getting rid, in this way, of an intolerable life (Walsh, 1831, p. 265).

The Bonny River case is marked by the surprise of the crew at the deaths among the slaves. It is notable that these were slaves who had

just been taken aboard and thrust below decks. The crowding may not have been more marked than on thousands of other occasions of the slave trade in which relatively few casualties occurred. What may have been at work again was the unusually agitated state of the slaves, as contrasted with the more typical resigned and apathetic state.

A similar account was provided by a clergyman who wrote of the disastrous effects of the packing of slaves into a ship's hold during a squall.

> 400 wretched beings thus crammed into a hold 12 yards in length, 7 in breadth, and only 3-1/2 feet in height, speedily began to make an effort to reissue to the open air. . . . The after-hatch was forced down upon them. Over the other hatchway. . . a wooden grating was fastened. . . . [Next day] 54 crushed and mangled corpses lifted up from the slave-deck have been brought to the gangway and thrown overboard. Some were emaciated from disease; many, bruised and bloody. . . some were found strangled, their hands still grasping each other's throats, and tongues protruding from their mouths. The bowels of one were crushed out. They had been trampled to death for the most part, the weaker under the feet of the stronger, in the madness and torment of suffocation from crowd and heat (Hill, 1884, pp. 47-48).

9. Mutual Aid in the Acute Crowding Disasters

It is misleading to leave the impressions of complete mutual destructiveness in the illustrations that have been given of crowds gone mad in acute crowding disasters. Regarding at least a number of these

episodes, survivors and observers report both attempts at mutual aid and protection among family members, friends, and small groups within the apparently chaotic crowd, as well as some concerted survival efforts of the group as a whole.

In the Japanese prisoner ship example, Stewart (1961) describes what occurred after the group had partially settled-down after the wild melee that was described above:

> . . . Soon we heard that men were smothering to death back in the extremities of the hold.
>
> Those of us who had shirts began to fan the air back to the rear so that the men behind us could breathe. They were suffocating and that took our minds off ourselves. Every man who could took off his shirt or trousers and fanned, hoping it would cause a suction in the air above (Stewart, 1961, p. 125).

Stewart also describes the continued intense loyalty through this crisis of his immediate "buddy" group.

From the Bethnal Green air raid shelter disaster, there are descriptions of people hopelessly pinned under the weight of scores of bodies above them on the stairs helping to extricate children and to pass them overhead to safety (Great Britain, Ministry of Home Security, 1945). Such examples can be multiplied.

10. Psychophysical States and Survival

A state of high agitation among the victims is apparently a factor differentiating some of the episodes of extreme overcrowding that we have discussed as acute crowding disasters from those with low casualty

rates but with similar degrees of crowding and apparently similar degrees of restricted ventilation and external environmental temperatures. As examples of the latter we can take many voyages of the Middle Passage during which almost no casualties occurred, or various voyages of the British convict transportation.

Looked at in another way, it may be possible to attribute the survival of African slaves or British convicts in these cases indirectly to results of the severe oppression to which they had been subjected. By the time they were embarked on their passage most of these persons had been reduced to states of apathetic, dull, resigned despair. They had been enfeebled in many senses (although "hardened" in others) by long periods in the barracoons, in the case of the African slaves, or in the "hulks" in the case of the convicts. To use a frequently-used phrase, they had been forced into a state of "semi-existence." Their food and water intake were very low. Shackles, as well as incredibly cramped quarters, precluded much of normal gross muscular activity. Many other factors can be cited tending to reduce the metabolic activity of these persons far below rates usually observed. With mental, digestive, circulatory, as well as peripheral muscular activity sharply curtailed, one may speculate that the entire homeostatic system of these individuals may have been shifted to extraordinarily low levels. Repeated exposure to extremely high temperatures which characterized these populations would further reduce or cancel the effects of high temperature toward increasing metabolism by direct stimulation of cellular oxidation (Bruce, 1960, p. 8).

The conditions of the Middle Passage or the convict transports, it would appear, reduced both oxygen consumption and heat production to levels far below what one would predict on the basis of calculations for such crowding in such well-insulated space using output values of normal metabolic activity.

Such considerations actually qualify tremendously any optimistic conclusions one can draw about the extent of human tolerance for extreme degrees of crowding in conditions like those of sheltering following a nuclear attack. The latter circumstances would be more like those of our acute crowding disasters. The shelter-takers, presumably, would be in a highly excited state upon entering the shelter. They would not be acclimitized, as was the case of populations in our low-casualty, intense crowding episodes. Physiologically and psychically, they would be characterized by hyperactivity. The upward cycling contamination of the environment with outputs of CO_2, water vapor, and heat could be expected. Relative lassitude, such as was present from the outset of the voyage among the slaves and old prisoners, would not inhibit mutually destructive, violent activity among the shelterees. In many of the historical cases, large thermodynamic imbalance between the enclosure and its environment were produced by the metabolic activity of overcrowded persons. These imbalances increased rates of heat loss and air interchange with the surroundings (Brasch, 1959, p. 37; Hill, 1913; Bruce, 1960). Such interchanges, however, would be severely inhibited in those types of shelters designed or selected for maximum shielding from the atmosphere.

What browbeaten, shackled slaves and prisoners could take obviously provides no guide to what the contemporary American citizen could survive.

The above discussion should not be interpreted as suggesting that extreme oppression, subjection and dejection are sine qua non of surviving conditions of extreme overcrowding. It is possible, however, that such negative states of those affected are explanatory variables in a few of the most extreme of all the incidents surveyed. It is also useful to stress this kind of hypothesis for pointing-up the more general truth that there is no automatic correspondence between what is valued or valuable in ordinary circumstances and what may have survival advantages in extraordinary ones.

Such oppressive measures as shackling, which have been interpreted here as possibly contributory to the survival of slaves, were not consciously employed to this end. Indeed, the lore of the slave traders was to the opposite effect--they believed it was preferable to exercise the slaves and to protect their spirits against the dangers of "fatal melancholy."

> When the weather was fine the slaves were also brought on deck--for exercise. Shackled in pairs by chains to ring bolts in the deck, they were made to dance and sing by means of the ever ready cat-o-nine tails. With swollen, galled and often diseased limbs, this hopping up and down in their heavy leg irons was a painful operation. . . (Lubbock, 1935, p. 12).

There was also usually great concern with seeing that slaves were fed on the passage. Weight and tonus were important factors in their selling price to which the traders paid as much attention as they could. In actual practice, however, numbers landed was a more powerful determinant of profit than the condition of slaves on landing and loading was

so tight that it would appear that only a fraction of those transported could have been subjected to such toning treatments as dancing and airing.

Sinking into hypoactivity and depression, as was frequently illustrated among the slaves, could also be a cyclical process leading to death. The well-known phenomenon of the Muslims of the Nazi concentration camps and dozens of other examples of fatal apathy (see Greenson, 1949) illustrate the point. It is less dangerous among groups, such as the slaves, that are ministered to by others concerned with insuring their survival, than among those who must work vigorously to insure their own survival--such as many prisoner groups, shipwrecked sailors, or explorers.

From the review, little can be said about the conditions under which a stabilization is effected at a homeostatic level low enough to be consistent with survival, yet not so low as to leave the person too highly vulnerable to many disease states and further downward cycling.

II. Adjustment in Moderately Severe and Moderate Overcrowding

The same kinds of adjustment mechanisms that we have drawn upon to explain how survival was possible in certain situations characterized by the most extreme degrees of overcrowding are the very ones that are most frequently mentioned among the abnormal and pathological reactions in less severely overcrowded situations. Apathetic withdrawal, privatization, failures to "rise to the occasion" and to cope actively with the stressful demands it presents--these are given as the sources of disastrous consequences in what might otherwise have been only moderately severe

cases of overcrowding. The literature on prisoners of war and concentration camp prisoners contains particularly frequent references to fatal effects of psychogenic apathy, withdrawal, and lassitude, and of similar behaviors arising from starvation.

In its positive version, the same considerations figure in explanations advanced to account for exceptionally good adjustments to crowding stress. As an example, many sources aver that the apparently intolerable conditions of overcrowding in the steerages were rendered tolerable for immigrants to the Americas by their high morale and anticipations. The extreme conditions aboard ship, it is said, only rarely dampened their enthusiastic visions of the prospects ahead of them in the New World. High spirits sustained them through adversity. Much the same kind of explanation is given for endurance of hardship in many other circumstances--confidence of early rescue on the part of the prisoner or castaway; or of the attainment of some goal as in the case of explorers.

A more noteworthy case from recent history was the post-World War II migration of European Jews to Israel on small ships. Quite typical of the degree of overloading was the 650-ton ship Fede which, on a ten-day voyage, carried 1,014 men, women (70 pregnant), and children. Its sleeping space, below decks, capacity 500 persons, consisted of tiers of canvas strip at two-foot heights. On a passenger/tonnage basis, this ship was packed to about six times the density of the late 19th Century ships carrying immigrants to America, and three times the density of ships of the early period of immigration. To avoid detection as a carrier of illegal immigrants, the ship required everyone to remain

below during daylight hours. Again, the enthusiasm of the immigrants is cited to explain their tolerance for these extreme conditions. Previous adjustment to privation in concentration camps and displaced persons camps (as well as a natural selection effect of the rigors of these camps) may also have been a factor.

The morale factor is cited for its physiological, psychological and sociological benefits. To be effective, however, the environment must provide the essentials for sustaining the high level of physical and mental activity associated with high morale. The environment must also be such as can be perceived with confidence as one that is endurable.

12. Vital Secondary Effects of Overcrowding

The present review has concentrated on material bearing directly on problems of survival. There was a corresponding neglect of the relevance of material for knowledge of social and psychological aspects of overcrowding. Within most of the ranges of density covered by the listing of incidents in the charts presented earlier, to the extent that crowding is a meaningful variable by itself, it is in the social and psychological senses that this is the case. From the standpoint of physiology, the effects of overcrowding can better be studied in terms of much more unitary variables--for example, effects of heat, oxygen insufficiency, types of air contamination, sleeplessness, etc.

Social and psychological aspects of crowding can have secondary effects, as in the cases of euphoria and depression, promoting or hindering the physiological survival of the populations involved.

Rarely do historical depictions permit a clear-cut attribution of casualties to such factors, however.

Some of the social aspects of overcrowding that may have such vital secondary effects were noted during the course of the review.

13. Some Social Aspects of Overcrowding

Spatial segregation is a pervasive principle of social organization. Close physical association is associated with psychosocial intimacy. Such intimacy is inappropriate to various role relationships. Physical separation and barriers to visibility, for example, allow occupants of certain roles to display only those segmental aspects of the self that are appropriate to the restricted role relationship. Proximity enforces a great deal of interaction that is inappropriate to various segmental, impersonal role relationships (see Coser, 1961).

The two most frequently considered requirements for spatial segregation are (a) the protection of superordinate status positions against overintimate exposure to subordinates and (b) the maintenance of physical barriers to socially proscribed sexual arousal and intimacy. Historical cases show frequent breakdowns of both of these kinds of relationships because of overcrowding.

In situations of long enforced intimacy, formal rank distinctions tend to break down. Illustrations are the gradual adoption of first name and other familiar forms of address among military personnel of widely disparate ranks who are held in close confinement with one another (Biderman, 1963). Torrance's (1957) various findings on the replacement of formal leadership with informal leaders who manifest

greater technical and social skills in coping with a stress faced by the group were developed in observations of military groups in highly intimate association.

Conventional proscriptions of sex activity have also frequently broken down in historical instances of overcrowding. The official literature on immigrant transportation and on the civil defense shelters in World War II manifested serious concern about the high incidence of promiscuity. Homosexuality has frequently led to serious problems of group relations in prisoner groups. While under long-term deprivation and severe stress, there may be a decrease of sexual motivation--the glandular activity of the gonads decreases under prolonged underfeeding (Keys, et al., 1950)--general stress of a short-term nature may increase sexuality (Seaton, 1962). Under conditions of crowding wherein there are few demands on the energies of persons and few diverting channels, as for example on the immigrant ships (see Appendix B) or in submarines (Eren, 1959), and even for many prisoners experiencing the severe deprivations of the Nazi concentration camps (Biderman, 1960), there was a high preoccupation with sexuality. Under some circumstances and with some personalities, intense repression of all conscious sexuality can arise from impulses toward tabooed sexual activity in overcrowded situations. An example given by Biderman (1960) is repression of sex among groups of all male, military prisoners, possibly arising from controls of latent homosexuality.

Allocations of space to provide for segregation by rank and sex sometimes can seriously aggravate space shortages. In the use of existing

partitions or makeshift partitioning in shelters to provide privacy, difficult considerations of balance between the most equitable per capita space allocations and segregation value would be involved.

Another function of segregation is to concentrate interaction within "in-groups" to insulate the normative and social structure of the in-group against the contamination of its members by inconsistent influences. This is particularly true of the treatment of incompletely socialized members of groups. An example is the neophyte such as the Army recruit who is restricted to his camp during his initial socialization. A most important case is the young. Among a hetergeneous group in conditions of crowded, communal living, parents complain of their inability to control the contacts of their children. The Japanese Relocation Camps, displaced persons camps, or the slums, which were not overcrowded in the physical sense used to rate situations in the present study, are overcrowded in this sociological sense. Further discussion of the matter is contained in Appendix C on the Japanese-American Relocation Centers.

Enforced intimacy can be highly disturbing to some personalities. One dynamic involved is discussed by Goffman (1959) in terms of the requirements for maintaining a prepared "front" in encounters with others in order to protect the ego.

Where the enforced intimacy is extremely close and prolonged, and where matters are further exascerbated by stress and discomfort, the sources of irritation and friction become extreme. Stories of arctic explorers have popularized this recognition. Lindsay, 1935, writes:

> Some aspects of the intimacy of sledging life have not any parallel elsewhere; no, not even in marriage. (I am thinking at this moment of the sanitary arrangements when we lay up in a blizzard, perhaps for days together, in a tent which was so small that we covered the whole floor space when we lay down). It is common knowledge that there is usually discord when two or three men are forced to live together in the unrelieved possession of each other's company. In our case you must square and cube the strain of unbroken intimacy. . . (Lindsay, 1935, p. 206).

In overcrowded living, however, social and psychological devices for maintaining privacy partially substitute for the lack of physical cnes. Most people s' 'singly quickly accept new norms more consistent with the objective limits of the situation about what need not be hidden from the view of others. Problems may arise because of the differential rate of such acceptance among members of a group. Psychological withdrawal and psychic insulation, as noted in various prisoner groups (Biderman, 1960) provide additional sources of protection.

In stress situations, despite continuous close physical contact with many others, it has been observed that persons tend to restrict their intimate, reciprocal social contacts to just one or two others (Schacter, 1959; Seaton, 1962).

Traditionally, the crowding together of persons has been looked at by sociologists as facilitating pressures and controls of the group as a whole on the individual--the emergence of a "crowd psychology" and the functioning of a "group mind." The kinds of collective behavior traditionally at the focus of attention in social psychology are highly

pertinent to crowded conditions during their early phases and those in which the energies of members are not debilitated by such factors as heat, starvation and exhaustion. Under the latter conditions, the restrictions of interaction noted here tend to occur. While sources of mutual irritation may increase greatly in the hard-pressed group, its members may lack the energy to argue about them or even to react very intensely at an emotional level. (See Seaton, 1962, p. 68.) Rather than the "crowd psychology" usually noted, members of the debilitated crowd frequently lack the energy to enforce group expectations against deviant members. Fractionation into cliques and small buddy groups is frequent.

There is an interaction between the various social aspects of overcrowding and the more directly physical environmental aspects. While we tend to think of the criterion situation as marked by far greater equality and egalitarianism than is found in normal social life, the common participants in an overcrowded situation are not all impacted in the same way by the hardships of the environment nor is there equality in their reactions to it. Space may be highly differentiated within an enclosure making some persons much more insulated against the hardships of the situation while others are more exposed to it. Some persons are more resistant to some stresses than others, as for example, heavier people with respect to cold (the matter of body type and tolerance for heat is considerably more complex).

An example involving ventilation can illustrate the point.

A recurrent hazard with ventilation in overcrowded situations is that inadequate ventilation, somewhat in the manner of radioactivity, is

not necessarily directly perceived through pain and discomfort as a threat. As a result, a confined group cannot be relied upon to do its utmost to insure an adequacy of ventilation. Uncomfortable cold and draughts will be frequently combatted more vigorously than the danger of asphyxiation. In some overcrowded situations, the peril is heightened by the fact that those persons who are best off with respect to the air supply--those situated directly in front of forced air ducts, for example--may block the draft to ensure their comfort, while those persons remote from the opening are suffering from heat and suffocation (see Appendix B).

Writing on the basis of a review of studies of internment situations for their relevance to shelters, Biderman earlier discussed some social aspects of overcrowded space:

> In the earliest stages, the social problems which arise involved the collisions and conflicts of the activities of individuals because of the scarcities of the environment; particularly the scarcity of space. Frequently, there is a competition for space, pure and simple--space to sleep, space to eliminate, space for possessions, etc. The earliest organization in many groups involves the division of space. Sometimes, the outcome of this process is of vital significance for individuals and the group as a whole. Measures of the differential value of space, other than size, are needed in shelter planning and allocations.
>
> There are many precedents in history recommending that it is not a wise procedure, where space is scarce and highly differentiated with respect to desirability, to leave matters to be worked out by competition or agreement within the group. Factors which differentiate space in a critical manner may also not be discernible at the outset. Thus, space against a wall is generally extremely desirable for occupancy on a number of counts--neighbors are reduced by half, it can be leaned against, it can serve as an anchor for

pegs and screens, it is apt to be out of the stream of traffic, etc. The unavailability of community space appears sometimes to be a factor retarding the development of larger group activity. Pressures on space, particularly during initial periods, have been aggravated by the physical state of prisoners--contagious disease, incontinence, and flatulence have sometimes been the rule rather than the exception. Tas, for example, describes difficulties of treating enuresis which was common among children in a concentration camp in which family units were held together under crowded conditions. Demands by neighboring families that parents take stern action, he says, accentuated the anxieties producing the complaint, diuretics would have done far more to eliminate group friction than the best of social workers. The psychological stress associated with shelter-taking, apart from organic causes, like capture, can be expected to produce in many persons reactions obnoxious to others. Ideally, space would be provided to which those afflicted could remove themselves, or be banished. Similarly, provision would be useful for the isolation of those who have, or are suspected by others in the group of having, contagious disease (Biderman, 1960, pp. 50-51).

14. Conclusions

a. Historical incidents have been identified in which currently accepted values of the limits of human toleration for overcrowding (including inadequacies of cooling, ventilation, etc.) were greatly exceeded, but which were not characterized by high rates of death.

b. Moderately severe conditions of overcrowding have been rendered tolerable by high states of morale. The acceptance of the overcrowded circumstance as necessary to the achievement of some highly valued goal that is shared among the confined group was involved in these situations. Such groups were marked by a high degree of active and deliberate efforts to cope with the environment.

c. In the most extreme situations of overcrowding, the environment cannot sustain a high volume of human activity. "Morale" is an irrelevant concept for such situations. The hypothesis is suggested that survival in such circumstances has been possible by a severe constriction of psychological responsiveness and physiological activity. Where such constrictions have not occurred, excessive production of heat, CO_2, water vapor, and other products of human metabolism cycle upwards to intolerable levels. In a highly active group in such circumstances, the desperate physical and psychological activities of those confined increasingly become mutually self-destructive. The extreme apathy and imposed physical constraint characteristic of persons who have been subject to oppression over a long period of time, such as prisoners and slaves, have increased their ability to tolerate extremes of overcrowding and associated deprivations.

d. The acts of malevolent captors and epidemic conditions were the two most frequent bases for differentiating between situations of high and those of low mortality which were otherwise marked by similar degrees of overcrowding.

e. Physical density, per se, is not regarded as a fruitful unitary concept for use in scientific study. For all but those extreme values approaching the physical displacement of the human body, density of occupancy has significance only in interdependent relationship with many other variables of the situation: environmental, structural, temporal, psychological and social.

f. It appears unlikely that persons seeking shelter after a nuclear attack would possess any of those physiological or psychological characteristics that are believed to have made for the most exceptionally high rates of survival among the historical incidents studied; i.e., the euphoric state contributing to high endurance of hardship by eager immigrants in moderately severe overcrowding: or the radically curtailed life activity in extreme overcrowding, such as on slave ships.

15. Suggestions for Research

a. Analyses of the multivariate association of such factors as density, ventilation, duration, water intake, food, size of group, etc., could be accomplished using data from a number of the more completely described historical situations that were reviewed during the course of the present study. Such analyses would be required for testing and refining some of the observations stated in the present report and for examining additional hypotheses that could not be tested within the limits of the present project.

b. The kinds of data collected are believed to be more fruitful for developing knowledge and hypotheses regarding behavioral phenomena under conditions of overcrowding than for a direct inquiry regarding factors determining survival. Some of the meanings of segregation and privacy particularly merit empirical elucidation. Study of behavioral and organizational dynamics among people in overcrowded situations would utilize data from less extreme situations than those on which attention was focused during the present review.

c. Research on sheltering, as well as shelter planning, should consider the possible significance of circumstances under which shelter-takers would be characterized by hyperactivity or by hypoactivity, as well as situations such as in current occupancy tests, in which the level of excitation and activity of shelter takers is in the more normal range.

d. Consideration of historical incidents may provide valuable perspectives for the conduct and interpretation of shelter experiments and occupancy tests. Similarities and differences between historical incidents, on the one hand, and possible circumstances in civil defense shelters, on the other, should be considered systematically in order to identify factors that historically have proved to have significance for survival and well-being. This may help insure that such factors are not overlooked in simulation designs.

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APPENDIX A

AFRICAN SLAVE TRADE

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1. Introduction

The African slave trade of the 18th and 19th Centuries was a radically different sociological phenomenon from envisioned civil defense emergencies. Yet, a number of features of the slave trade make its consideration particularly pertinent for information regarding the limits of human tolerance, given the most extreme degrees of overcrowding:

a. The duration of the ocean crossing from Africa to the West Indies was five to six weeks.

b. Those responsible for the slave trade had an interest in the maximum utilization of space consistent with the successful transport of as many slaves as possible. Unlike other comparable situations of captivity, those responsible for the conduct of the trade essentially were not guided by malevolent motivations toward the slaves since deaths represented a very real financial loss. At the same time, they remained unmoved by humanitarian considerations toward their cargoes or any other consideration, for that matter, beyond using the available space to its maximum in order to deliver human beings to their purchasers alive. There were no "frills."

c. Conditions were such in many of the ships as to make the confinement for most of the victims continuous and uninterrupted. While

slaves were sometimes stowed above decks and some slaves on some ships were allowed above decks for feeding or ventilation, the majority of the slaves transported apparently spent the entire crossing confined below decks.

d. A ship, particularly in earlier historical periods, was a highly self-contained system; cut off from the period of the voyage from transactions with the larger society.

e. The tight construction of ships, particularly when battened down in weather, created extreme ventilation problems for persons crowded below decks.

2. Availability of Source Material

There are many sources of information describing the conditions of crowding aboard slave ships, as well as discussions of the physical and behavioral effects of these conditions. The works located were largely generated by political controversies regarding the abolition of the slave trade or were popular accounts written by crew members. Works providing detailed information on crowding and its effects originated with anti-slavery sources. Proslavery writers apparently glossed over the manner in which slaves were transported. Even the defenders of the institution did not regard the transport of slaves as its brightest feature.

In spite of the obvious biases of even the best sources, many of them nonetheless contain detailed and careful documentation of such

matters as dimensions of ships, "stowage" of slaves, diet, and the incidence of extreme morbidity, and mortality. Inquiries of select committees of the British House of Commons have been particularly fruitful in these respects. Other valuable sources of information are the personal accounts of ship surgeons and crew members. No source was located involving a purely technical discussion of slave transport from the perspective, say, of a ship owner or master.

In addition to English sources, accounts are available in Portugese, French and Spanish.

3. The Middle Passage

This review has concentrated on descriptions of the Middle Passage, as the transport of slaves from the west coast of Africa to the West Indies was called. The voyage from Guinea to Antigua in the West Indies averaged from five to six weeks. The longest passage of a slave ship between Africa and the West Indies noted was about 50 days.

Slave ships ranged from 90 to 350 tons. A typical slaving vessel used in the 18th Century--called "a snow"--was about 140 tons, square of stern, 57 feet keel, 21 feet beam, 5 feet between decks and 9 feet in the hold (D'Auvergne, 1933). A slaver, repeatedly described in select committee reports, was the Brookes (see Illustration 1). The Brookes was a frigate-built, 320 ton ship; 100 feet long; 25 feet, 4 inches beam; 5 feet, 8 inches between the decks. It had 14 air ports.

4. Crowding on Slave Ships

The Brookes is an interesting case because it was engaged in the slave trade both before and after the English Regulation Act of 1788 which imposed limits on the crowding of slave ships. Prior to the statute (and illegally after it) the Brookes is reported to have carried slightly over 600 slaves, in addition to a crew of 45. The Statute set the limit of five men to every three tons for vessels of under 150 tons, and three men to every two tons for vessels above 150 tons. It required not less than five feet clearance between decks. By this rule, the Brookes could carry only 450 slaves, as shown in the Illustration. Following the regulation of 1788, according to one source (Wilson, 1851), "stowage" on the Brookes could allow a space 6' x 1'4" to each man, 5'10" x 1'4" to each woman, and 5' x 1'2" to each boy. This arrangement of space is shown in the Illustration. In deck areas holding men, this legal allocation provided 25 to 30 cubic feet of space per person. However, the Brookes with a cargo of 609 slaves stowed them as follows:

> 351 men were crowded into the space of 46 feet by 25 feet 4 inches; 90 boys were packed into the boys' room measuring 18 feet 9 inches by 25 feet, and 168 women and girls were stowed away in the confines of 28 feet 6 inches by 28 feet 6 inches (Lubbock, 1935, p. 9).

With the height between decks given as 5'8", space permitted per person was: a) men: 3.34 square feet, 18.8 cubic feet; b) boys: 3.8 square feet, 21.7 cubic feet; c) women: 3.4 square feet, 19.4 cubic feet.

Even after the Regulation Act, slave ships were said in select committee testimony to have continued overloading--this being accomplished by stowing slaves spoonwise, one within the distended legs of the other, and having others in various cramped sitting postures. The 5-foot height requirement was circumvented by the construction of shelves or platforms. Platforms were 8 or 9 feet in breadth, extending from the side of the ship towards the center. They were placed mid-height between the decks leaving a distance of 2 or 3 feet from each deck. Upon these slaves were stowed in the same manner as on the deck underneath. Thus, the space was often so low that slaves "sat between each other's legs, and were stowed so close together that there was no possibility of their lying down, or at all changing their position, by night or by day" (Clark, 1860, p. 27). Eye witness reports of such extreme degrees of crowding are frequent in the literature; e.g.:

> The men negroes on being brought aboard are immediately fastened two by two by cuffs on their wrists and by irons riveted on their legs. They are frequently stowed so close as to admit no other posture than lying on their sides (Russell, 1948, p. 39).

In other testimony the following illustration is given:

> Seventeen men shackled togethered in pairs by the legs, and 20 boys one on the other in the main hold; a space measuring 18 feet in length, 7 feet 8 inches main breadth, and 1 foot 8 inches in height. . . . The space allowed for the females, 34 in number, was even more contracted than that for the men, measuring only 9 feet 4 inches in length, 4 feet 8 inches main breadth, and 2 feet 7 inches in height. . . (Religious Society of Friends, 1824, p. 60).

In this ship's hold, the alleged allocations compute to 6 cubic feet for males and 1.3 cubic feet for females. Between decks, a man could not stand upright. Males and females generally were placed in separate compartments. The women were left unchained. The men were generally kept throughout the voyage chained in pairs, wrist to wrist, ankle to ankle. Those who were left unchained were packed in couples, side by side, like sardines, or spoon fashion--the head of one between the feet of the other.

The central questions about the slave trade that are the focus of the present paper were reflected in contemporary controversy of that period. There were two contending schools of thought among slave captains with respect to overcrowding. One school, the "loose-packers," argued that by giving slaves more room, mortality during the Middle Passage would be reduced and a better price for each received. This argument was answered by the "tight-packers" who contended that although mortality was higher on an overloaded vessel, so too were net profits. The argument continued for the duration of the trade but it appeared that the "tight-packers" were in the ascendance (Mannix, 1962, pp. 105-106). As the discussion to follow indicates, if humanitarian considerations are put aside completely, the data were indeed ambiguous with respect to which of these schools of thought on "packing" was "right."

5. Mortality

A wide range of mortality rates among slaves during the Middle Passage is reported; varying from isolated voyages in which no losses

at all occurred to a few in which epidemic conditions are reported to have carried off all of the slaves along with a large proportion of the crew. Gross estimates made by the Committee of the Privy Council for Trade in 1788 to 1789 from information given by 23 persons who had been engaged in the trade prior to 1788 indicated that the average mortality for the passage in English vessels was 13 per cent. During the period of the Regulated Slave Trade, from 1788 to 1808, a House of Commons select committee concluded that mortality in the Middle Passage averaged 14 per cent, and that during the illegal slave trade after 1815 when more intense overloading was practiced and inferior vessels used, it averaged 25 per cent (see Summary Table, p. A-31).

Slave traders operating on experienced assumptions calculated the mortality expected during a voyage and overloaded in order that there would be replacements for those who succumbed during the passage; as illustrated in the questioning by Gladstone of a select committee witness, M. J. Higgins:

> (Gladstone) But do you think that they would pack 500 slaves in a vessel of 120 tons? -- They always buy now, not only the number which they want to import, but a certain number to throw overboard during the passage.
>
> Q. You hardly mean that they buy slaves for the purpose of replacing those who die and are thrown overboard; they calculate on a certain number of deaths during the passage, and they buy more than they know they shall land in Brazil to promote death vacancies (Great Britain, House of Commons, 3rd Report, 1847 to 1848, p. 77).

Overloading with the anticipation of a certain rate of mortality owed part of its rationale to the traders' belief that they could not make accurate advance predictions of the ability of individuals to survive the rigors of the voyage. They therefore used a natural selection process:

> . . . the effort of a slave captain is to land as many slaves as he can on the coast of the Brazils; but as it is not possible for the most practised eye to tell a healthy from an unhealthy slave by seeing him in the barracoons, if the vessel could take 300 slaves moderately crowded, the captain would take half as many again, say 450, and cram them on board below and on the decks, for the sake of putting them to the test, knowing that all those who were not likely to cross the Atlantic would sicken during the first 48 hours; then directly they show the symptoms of weakness, on account of their weak constitution, they are put on one side of the deck; no food nor water is given them, and they are allowed to die; they are then thrown overboard. Then at the end of 48 hours that man has a prime cargo of slaves of those who do not sicken. Those whose constitutions are strong enough to stand the first crowding and the heat will live till they have crossed the Atlantic; they will live during the passage (Great Britain, House of Commons, 1st Report, 1847 to 1848, p. 102).

The mortality rates discussed took place among a population that had been exposed to privations of captivity for various periods of time, since the capture of their village. Mortality during the trip from the interior and as well as the coast-wise passage prior to the Middle Passage had exercised some selective effect--less hardy persons having perished prior to embarkation.

Africans who were brought from the interior and hence never exposed to the Atlantic coastline experienced severe psychological

trauma during embarkation. Some were reported to have flung themselves on the beaches in a last moment effort to remain in Africa (Mannix, 1962, p. 47). According to an eyewitness report recorded in Mannix:

> The negroes are so wilful and loth to leave their own country, that they have often leap'd out of the canoes, boat and ship, into the sea, and kept under water til they were drowned, to avoid being taken up and saved by our boats, which pursued them; they having a more dreadful apprehension of Barbadoes than we can of hell, tho' in reality they live much better there than in their own country; but home is home. . . (Mannix, 1962, p. 48).

On the other hand, slaves who had been held for long periods in the barracoons awaiting passage were judged less likely to survive the passage because of their already sick and debilitated condition. At the select committee hearings, a surgeon with intimate knowledge of the slave trade stressed that mortality rates during the Middle Passage were directly related to the duration of time spent in the barracoons.

> Q. From the circumstances of dispatch under which you have described that the slaves are constantly embarked, are they not occasionally embarked when they are infected with dysentery, and opthalmia, and fever? -- They are brought down from the interior of the country, and frequently remain for some length of time in the barracoons, upon a very small or imperfect allowance of food; they become much debilitated by it; consequently, when they are packed on board the mortality will be greater in consequence of their sufferings having been so much prolonged. . . . -- Q. The slaves being packed in those large numbers, and exposed to a long journey after a considerable detention, are very liable to suffer from diseases? -- Yes, those are the cases in which the mortality is much the greatest, where they have been detained for some length of time in the barracoons, not having had an opportunity to be shipped; those are the cases in which the mortality is the greater, because their systems have been worn down previously to being put on board the vessel (Great Britain, House of Commons, 2nd. Report, 1847-48, p. 45).

6. Condition of Slaves After the Passage

When slave ships arrived at their destination, the slaves were subjected to sale by one of three methods 1) scramble, 2) lots, or 3) public auction. In the plantation colonies of the South in pre-revolutionary America, slaves were consigned to commission merchants and sold at a public auction on an individual basis. Slave trade in the South reached its heights in the years 1764-1773, and then soon declined. This occurred partly for humanitarian reasons, but mostly because of the over-accumulation of slaves (Mannix, 1962, p. 169).

The more predominant method of sale was the "scramble" which prevailed in the West Indies. The sale usually took place on the decks of the ship. The buyers were informed that the firing of a gun signaled the opening of the sale. Prospective owners would then rush on deck, encircle with several handkerchiefs tied together as many slaves as possible. The impact of the "scramble" on the slaves is described in Mannix:

> For the slaves, many of whom thought they were about to be eaten, it was a terrifying climax of a terrifying voyage. Another of Falconbridge's ships, the Alexander, sold its cargo by scramble in a slave yard at Grenada. The women, he says, were frightened out of their wits. Several of them climbed over the fence and ran about Saint George's town as if they were mad. In his second voyage, while lying in Kingston harbor, he saw a sale by scramble on board the Tyral, Captain McDonald. Forty or fifty of the slaves jumped overboard - "all of which, however," Falconbridge told the House of Commons, "he believes were taken up again" (Mannix, 1962, pp. 129-30).

Conniving captains wishing to delude prospective buyers as to the true health of the slaves would block the anus of dysentery ridden slaves with oakrum (Mannix, 1962, p. 129). The unsold slaves from the "scramble" were the refuse or sickly ones but even these in 1788 were sold although at a much lower price, from $5.00 to $1.00 at a public auction (Blake, 1857, p. 133).

Conflicting reports are given regarding the survival and fitness of slaves in the West Indies after they were sold. Clarkson, a leader of the abolition movement, states that in addition to the 12-1/2 per cent that died during the Middle Passage and the 4-1/2 per cent that died while in the West Indies harbor or on shore before the sale, an additional one-third more died during the "seasoning," the initial harvest period (Clarkson, 1808, p. 546). He concludes:

> Thus, out of every lot of one hundred, shipped from Africa, seventeen died in about nine weeks, and not more than fifty lived to become effective laborers in our islands (Clarkson, 1808, p. 52).

For slaves brought from the east coast of Africa (Bonny, Benin, and the Calebars) Clarkson estimated the mortality to be much higher i.e., "in every hundred the deaths annually amount to no less than eighty-six" (Clarkson, 1808, p. 547). The English Privy Council in 1789 cites estimates similar to Clarkson's. If these figures are reasonably accurate, not more than one slave became a useful laborer out of every two taken from the African coast.

Testimony before the House of Commons Select Committee of 1847 to 1848, however, presented a less grim picture.

> . . . soon after they are landed they are taken care of at different localities, and in a very short time they improve. Most of them are in an extremely wretched condition when they are landed, and to look at them they are quite unfit for labour; but in a very short time they improve (Great Britain, House of Commons, 2nd. Report, 1847 to 1848, p. 120

Mortalities at the rates encountered were tolerable for the slave traders in that the cost of a slave in Africa was a trivial proportion of the entire cost of the operation and always a tiny fraction of the selling price in the West Indies. Despite the mortality rate of slaves during the seasoning, the clamor for more slaves did not abate. The average selling prices of all slaves landed also indicate that buyers regarded most of those who survived the passage as having considerable economic value. Such prices, both estimates for periods and the prices received from given recorded voyages, are discussed below in the section on the economics of the trade.

7 Ventilation

Ventilation aboard a slave ship usually was provided by gratings on the compartment tops to let in light and air, in addition to the air-ports which numbered from 10 to 15. When the sea was rough or rains heavy, it was often necessary to shut the ports.

The consequences of deprivation of fresh air have been dramatically recorded in the literature.

> The fresh air being thus excluded, the negroes' rooms very soon become intolerably hot. The confined air, rendered noxious by the effluvia exhaled from their bodies, and by being repeatedly breathed, soon produces fevers and fluxes, which generally carry off great numbers of them (Buxton, 1840, p. 126).

While this doctor's etiological attributions lack precision, the significance of factors other than oxygen and CO_2 levels for the health of the confined is clearly indicated.

An eyewitness account by a clergyman relates an occurrence in which 400 slaves were forced into a hold during a squall to a density of 6.6 cubic feet per person:

> The night, however, being intensely hot and close, 400 wretched beings thus crammed into a hold 12 yards in length, 7 in breadth, and only 3-1/2 feet in height, speedily began to make an effort to reissue to the open air. Being thrust back, and striving the more to get out, the after-hatch was forced down upon them. Over the other hatchway, in the fore-part of the vessel, a wooden grating was fastened. They crowded to the grating, and clung to it for air, completely barred its entrance . . . (next day) 54 crushed and mangled corpses lifted up from the slave-deck have been brought to the gangway and thrown overboard. Some were emaciated from disease; many bruised and bloody. Antonio tells me that some were found strangled, their hands still grasping each other's throats, and tongues protruding from their mouths. The bowels of one were crushed out. They had been trampled to death for the most part, the weaker under the feet of the stronger, in the madness and torment of suffocation from crowd and heat (Hill, 1884, pp. 47-48).

8. Heat

The Middle Passage was a voyage through tropical waters. Testimony given to the House of Commons Select Committee estimated temperature

ranges in the slave decks from 120 to 130 degrees F. or perhaps more; temperatures averaging 100° on deck (testimony given by Dr. Jose E. Cliffe who at one time was engaged in the slave trade) (Great Britain House of Commons, 2nd. Report, 1847 to 1848, p. 43). Ship's crew or surgeons could tolerate the heat below decks for only very brief spells (Buxton, 1840, p. 126).

9. Hygiene

Conventional practice appears to have been to completely shave all slaves before embarkation and to transport them completely naked (Ducasse, 1948; Lacroix, 1952). The rationale of having the slaves sit or lie on unpadded decks and platforms also involved the sanitary hazard of mattressing (Ducasse, 1948). On some ships, according to sources quoted by Lacroix (1952, pp. 129-132), each slave was forced to wash face and hands with salt water, smear his body with palm oil, and was given a vinegar mouth rinse as an anti-scurvy measure. He also relates that slavers would examine mouths and brush the teeth of their cargo.

Ducasse (1948), reporting a diary, relates that the between-decks on a French ship were washed down every three days by the slaves--300 to 400 buckets of water being used each time to clear away the accumulation of feces, urine, vomit and mucous. Captain Hugh Crow, who prided himself on the tidy condition (and consistently low fatalities) on his vessel, stated that many captains washed down their decks only weekly, and a few, only when they reached port.

The conditions of filth which the Africans endured, from these and other reports, does not appear due to the slavers being oblivious to

problems of sanitation, but rather the sheer magnitude of the task and the physical difficulties of cleaning and disposal in ships packed so densely as to make movement most difficult. As a consequence, there was apparently much basis for the moralists' depictions of the slaves wallowing in accumulations of eliminatory products and blood for the entire voyage, with thorough cleaning taking place only at turnaround.

The following testimony was given on sanitary facilities below deck on a Middle Passage ship:

> In each of the apartments are placed three or four large buckets, of a conical form, nearly two feet in diameter at the bottom and only one foot at the top and in depth about twenty-eight inches, to which, when necessary, the negroes have recourse. It often happens that those who are placed at a distance from the buckets, in endeavoring to get to them, tumble over their companions, in consequence of their being shackled. These accidents, although unavoidable, are productive of continual quarrels in which some of them are always bruised. In this situation, unable to proceed and prevented from going to the tubs, they disist from the attempt; and as the necessities of nature are not to be resisted, they ease themselves as they lie (Great Britain, House of Commons, [reprint] 1885).

10. Food and Water

Conditions varied considerably with respect to the provision of food and water for slaves. The impression from the literature is that traders placed great emphasis on ensuring sufficient intake, and perhaps overstressed the importance of food. The unpredictability of the time of crossing for a sailing vessel, however, made for a great many episodes of severe water and food deprivation. This was particularly true during the period of the illegal slave trade when a great premium was placed on

speed, and hence, light loading. Water rations were apt to be lower on the long trip around the Cape of Good Hope than on ships carrying west coast Africans.

A few sources claim voyages occurred in which water rations were a half-cup of water a day (presumably, one pint each two days)--from want of sufficient provisioning on badly overloaded vessels (Great Britain, House of Commons, 2nd. Report, 1847 to 1848, p. 45) or on vessels that were becalmed (Mannix, 1961, p. 209). Mannix's (1961, pp. 113-115) summary of a "typical day" on the Middle Passage, based on numerous sources, involves the serving of a half-pint of water at each of the two meals. According to the testimony of a seaman who served in the Middle Passage, crews seldom had enough water. Many captains, it is alleged, adopted as a device for conserving water, forcing members of the crew to climb to the topmast to retrieve a gun barrel each time they wished to drink. The gun barrel served as a straw for drawing water out of a cask on the deck and getting from the bung hole of this cask using the gun barrel was the only permitted means of securing water. The sailor was compelled to secure the gun barrel to the topmast after drinking. The double climb, they averred, left them thirstier than before (Mannix, 1961, p. 148). Another seaman testified of a voyage in which the water ration for the crew was initially three pints a day, but this was reduced an unspecified amount later in the voyage. The crew licked dew early in the morning to slake thirst (Mannix, 1961, p. 146).

It should not be concluded that the Africans' rations were necessarily worse, since many sources say that it was not infrequent for crew

members to be treated worse than the slaves and for them to beg and barter supplementary rations from better supplied slaves.

Detailed accounts of provisioning on Middle Passage ships indicate, however, that French masters estimated their water requirement as five liters per day per slave, and English merchants used a one gallon per day figure. In addition, the French conventionally provisioned one and a half liters of wine for the voyage from Indian Ocean points. (See, Lacroix, 1952, pp. 110-112; Rinchon, 1929, p. 196; D'Auvergne, 1933, p. 76.) The sources of water on the African coast were frequently poor and much of the water frequently became spoiled before the end of the voyage.

In the usual case, the attempt seems to have been made to ensure that slaves were fed, and insofar as quantity is concerned, not underfed:

> Unless the voyage was unduly protracted, the slaves, it may be supposed, were not generally underfed. It would not have paid their owners to starve them. The provisions carried by a ship for about six hundred slaves are stated at twenty tons of split beans, peas, rice, etc.; 2,070 yams, averaging seven lbs. each; twelve cwt. of flour; ten barrels of beef; twenty cwt. of stock fish; sixty gallons of molasses; seventy gallons of wine; 330 gallons of brandy, rum, etc.; 200 gallons of palm oil; and 3.400 gallons of water (D'Auvergne, 1933, p. 76).

For an east coast voyage of one French slave ship of about 300 gross tons carrying 300 slaves, provisions for the expected 75-day trip totalled 153.6 tons, of which 112.5 tons were water (Lacroix, 1952, pp. 110-112).

Yams, beans, corn, and rice were staple items of slave rations. Broths of boiled grain, yams with minute amounts of meat, and sauces made of palm oil, flour, water--both spiced with pepper--were apparently given to slave cargoes frequently (Dow, 1927, p. 144; D'Auvergne, 1933, p. 58). Slave traders appear to have believed that the risk of deaths and low prices because of poor physical condition were to be minimized more by getting the slaves to eat than by reducing overcrowding. The cost of food and space for storing it were a trifling matter in relation both to the total costs and risks of the voyages (especially in the illegal slave trade) and to the profits of the scale. Lacroix (1952) estimates the typical daily ration as about 800 grams (p. 132).

As the next section indicates, however, the overcrowding by which traders sought to maximize their gains sometimes interfered with their interest in seeing the slaves fed.

11. Confinement

On many occasions, all or most of the slaves never left their assigned space below decks during the entire period of the voyage. Some ships regularly rotated the Africans above decks for feeding and slaves at times were carried atop the casks. Occasionally, women, but not men, were brought above. The conditions of stowage usually made it impossible to do this for all or for even a few of the Africans on board. According to the testimony of a witness before the select committee on the slave trade, a great number of slaves were never

brought on deck (Great Britain, House of Commons, 2nd Report, 1847 to 1848, p. 46).

When weather permitted slaves were sometimes brought on deck and forced to dance by threat of cat-o-nine tails. Dancing was believed to be a cure for scurvy and melancholia. For the men who were kept in chains it resulted in swollen and bleeding limbs. When ordered to sing, the slaves complied with melodious tales of an awful yearning for their homes, their people and freedom (Mannix, 1962, p. 114).

With respect to the problem of feeding so many humans below deck, the same witness reported the following:

> If I were to speak the truth it would be this: the vessels are so excessively offensive that it is perhaps the greatest punishment to which you can put any person on board. There is some half-witted person whom they generally have almost on purpose for it, to pass the food round to them, and he is in such a hurry in doing that those who are nearest to one of the hatchways are more likely to get a double portion of food rather than that he should go round the sides of the vessel, which is so ill-ventilated that it produces a sickening effect upon him. Then he does not get upon the level which they are, and pass between the rows of them, helping each one singly. He should do it, but from the excessively filthy state it is not always done (Great Britain House of Commons, 2nd. Report, 1847 to 1848, p. 46).

As a consequence of their crowded state below deck he noted that those remote from the hatchway often go without food, "unless they can crawl up over the others, and get nearer to the hatchways" (Great Britain, House of Commons, 2nd. Report, 1847 to 1848, p. 46). He told the committee when asked whether he had been below deck on the slave ship,

"I have put my head below, but not for very long. A thorough-bred white man could not endure it; I have no doubt he would die from asphyxia" (Great Britain, House of Commons, 2nd. Report, 1847 to 1848, p. 46).

12. Morbidity

Dysenteries ("the flux") were pandemic during the Middle Passage. Virulent epidemics brought death rates on some voyages to the figures of 50 to 60 per cent mentioned here earlier.

Mannix (1962), echoing Clarkson (1791), maintains that mortality among crewmen was consistently higher than among slaves during the second half of the 18th Century. More fell prey to disease, African fevers, and scurvy than did the slaves. Reasons given for the high death rate among seamen were that they had not been exposed to deadly African fevers as had the slaves; crewmen spent more time on ship board completing the triangular nature of the voyage, as compared with the one leg travelled by slaves. Further, Mannix contends, owners and masters had actually a negative economic interest in preserving the lives of their crewmen, as compared with a positive interest in the lives of their slaves. In the 1780's a slave ship with a crew of 35 lost seven or eight men on ship board; 11 were left behind either in Africa or the West Indies and only 16 or 17 remained with the ship to complete the trip (Mannix, 1962, p. 151). Of those who returned to England, many were permanently crippled, blinded, or eventually died in the Liverpool or Bristol infirmaries (Mannix, 1962, p. 151).

Clarkson estimates that for the years 1784-1790, 12,263 men were employed on slavers, of whom 2,643 died, a mortality rate of 22 per cent (Mannix, 1962, P. 151. According to Clarkson "the English slave trade employed 5,000 seamen each year and that the yearly loss [death and disablement] was 1,950, or almost 40 per cent" (Mannix, 1962, p. 151).

The presence simultaneously of so many threats to existence makes it difficult to single out which of the myriad factors contributed most to death rates; if, indeed, it is reasonable to consider them as having independent effects. Among slaves lack of ventilation, heat and dehydration, disease, semi-starvation, sea sickness, and psychological withdrawal--all are described as contributing to a high death rate.

One ship's surgeon described conditions as follows:

> During the voyages I made, I was frequently a witness to the fatal effects of this exclusion of the fresh air. . . . My profession requiring it, I frequently went down among them, till at length their apartments became so extremely hot as to be only sufferable for a very short time. But the excessive heat was not the only thing that rendered their situation intolerable. The deck, that is, the floor of their rooms, was so covered with the blood and mucus which has proceeded from them in consequence of the flux, that it resembled a slaughterhouse (Buxton, 1840, pp. 126-127).

As in all situations combining extreme oppression, privation, and social uprooting, a high incidence of apathetic withdrawal and loss of apparent will to live is reported. The most prevalent reaction among slaves to the oppressive conditions aboard ship was described as "melancholia."

Lore regarding "voluntary death" among the Africans and means of its prevention that were prevalent at the time are also illustrated by the following quotation:

> Notwithstanding their apparent good health (Howe says) each morning three or four dead would be found, brought upon deck, taken by the arms and heels and tossed overboard as unceremoniously as an empty bottle. Of what did they die? And (why) always at night? In the barracoons it was known that if a Negro was not amused and kept in motion, he would mope, squat down with his chin on his knees and arms clasped about his legs and in a very short time die. Among civilized races it is thought almost impossible to hold one's breath until death follows. It is thought the African can do so. They had no means of concealing anything and certainly did not kill each other. One of the duties of the slave-captains was when they found a slave sitting with knees up and head down drooping, to start them up, run them about the deck, give them a small ration of rum, and divert them until in a normal condition (Mannix, 1962, p. 120).

Many vessels constructed nettings or lattice-works to prevent slaves from leaping overboard (Blake, 1857, p. 129). Blake also reports that slaves refused medicine, giving as the reason that they wanted to die (Blake, 1857, p. 135). As do other writers, he states that most suicide attempts involved refusing all sustenance (Blake, 1857, p. 129).

A ship doctor in stating reason for death among the slaves on his ship believed that the primary cause of death for two-thirds was "melancholy."

> Though several died of the flux, he attributes their death, primarily to the cause before assigned; for, says he, their original disorder was a fixed melancholy, and the symptoms, lowness of spirits and despondency (Blake, 1857, p. 136)

An additional stress was seasickness, and one source believes that this alone was a frequent cause of death (Russell, 1948, p. 31). The same author refers to an opinion that Negroes were more prone to seasickness than were Europeans, although no comparable observations are given justifying the statement. He also asserts that death was more frequently a consequence of seasickness among women slaves than among men.

Under these conditions it was not unusual to find that those who were in good health during the day were dead the next morning; dead and living often chained together (D'Auvergne, 1933, p. 68; Blake, 1857, p. 128).

The problem of removing the dead among so many closely assembled numbers was recorded in a testimony before a select committee of the House of Commons. "Bodies remained," recalled a witness, "until they have increased the amount of putridity; and, in fact, when they have been thrown overboard you could hardly keep them together, because the putrefaction would be so rapid in a temperature of that kind that in a few hours decomposition would take place; they would hardly hold together to be thrown overboard" (Great Britain, House of Commons, 2nd.Report, 1847 to 1848, p. 47).

13. Morale

Almost every source mentions measures to exercise slaves and to prevent "fatal melancholy." Forced dancing each fair day was apparently frequent, along with singing, both compulsory and voluntary. Lessons in Christianity and propaganda harangues to convince slaves that a marvelous life was in store for them, and even juggling performances, were employed by masters convinced that they must sustain the morale of the Africans in order to avoid casualties (see the diary, Mousnier, 1957, pp. 197-204).

14. The Economics of the Slave Trade

Profits accruing from the slave trade were enormous in both the legal and illegal phase. Although statistical evidence is not conclusive, a plethora of material exists on the finances of individual slavers as well as price lists on slaves at particular periods.

For the early phase of the slave trade the following estimates of average prices were developed (Mellor, n.d., p. 437).

	Africa	West Indies
1676 - 1679	£ 3	£15 - £17
1679 - 1688	£ 3	£13 - £16
1698 - 1707	£ 8 - £12	£10 - £14: £23 - £41
1755	£12	£35 14s.3d
1759	£14	£35 14s.3d
1763 - 1788	£12 - £15: £18 - £22	£28 - £35

The belief that the slave trade would soon be outlawed (which it was in 1806) resulted in an increase in the price of slaves toward the end of the 18th Century. In the 1790's preoccupation with continental wars that interfered with providing the West Indies with its expected numbers may also have elevated prices. In 1791, a male slave was sold for £ 50 and higher (Mellor, n.d., p. 437).

Liverpool, the center of the slave trade industry, was the major recipient of the profits of the trade.

> In the eleven years between 1783 and 1793 Liverpool put 878 ships into trade, shipped 303,737 Negroes from Africa, at a value of £ 15,186,850. Deductions for various commissions, and other charges, gave Liverpool a gross return of $12,294,116, or £ 1,700,000 per year. After all necessary expenses in transporting and insurance were calculated, it was estimated that there was a gain of 30 per cent on every slave sold. Liverpool, therefore, received a net income in the eleven slave years of over £ 2,300,000 on the 303,737 Negroes, or an annual rate of over £ 200,000 (Tannenbaum, 1947, pp. 17-18).

The effects of the financial wealth accumulating for Liverpool merchants proliferated throughout the business community, giving rise to numerous industries in Great Britain and other countries. In addition, the trade made possible the economic development of the West Indies as well as the plantation system in southern United States.

In the early 1800's demand for slaves was so great that slaves were reportedly sold for as much as $500 a piece (Mannix, 1962, p. 188).

In spite of the risks involved slave traders were lured into slave trade activity in the expectation of acquiring quick wealth. Captain Canot of the La Fortuna gives the balance sheet of a successful slave venture in 1827 (Mannix, 1962, p. 199).

Expense Account of the La Fortuna with
220 slaves consigned to Havana

Contraband

EXPENSES OUT

Buying and fitting out a 90-ton schooner	$ 6,200
Provisions for crew and slaves	1,115
Cargo (to be exchanged for slaves)	10,900
Advance on wages	1,340
Hush money	200
	19,755
Commission on this at 5%	987
Total expenses out	$20,742

EXPENSES BACK

Head money on slaves (for officers of schooner)	$ 3,492
Wages, officers and crew	2,938
Total expenses back	$ 6,430

EXPENSES IN HAVANA

Bribes to government officers (at $8 per slave)	$ 1,736
Factor's commission	5,565
Consignees' commission	3,873
217 slave dresses (at $2 each)	434
Extra expenses of all kinds, say	1,200
Total expenses in Havana	$12,808
Total of all expenses	$39,980

RETURNS

Vessel sold at auction	$ 3,950
Proceeds of 227 slaves	77,469
Total returns	$81,419
Total expenses	$39,980
Net profit on voyage	$41,439

The owners of La Fortuna sold their cargo for $357 apiece or more than seven times their original cost in Africa.

The nature of the slave trade was such as to make it difficult to estimate rationally whether, given the limited number of bottoms that could be enduced to enter the trade, the degree of crowded loading practiced was more economically advantageous to the traders and planters than more humane practices would have been. The reformers for a long time argued strongly that traders and planters defeated their own economic interests by overloading the ships; but most traders and planters were as strongly convinced to the contrary.

From the economic record alone, it is impossible to come to good conclusions as to whether the brutal rationale of the traders truly had logic in its favor. The reason for this is that, except for epidemic conditions that occasionally ravaged human cargoes (and officers and crew as well), variations in casualty rates among those transported was much less a determinant of economic success or failure than many other factors in the trade. The perils of the sea and the risks of capture were the major factors, the latter, particularly during the illegal trade. Costs of capital, rates, reliability and terms of insurance against losses, and relationships with factors (i.e., wholesalers) on the African coasts were other key factors in success and failure of trading enterprises. The slave trade, moreover, was part of a triangular complex involving bartered goods for the acquisition of the slaves and the purchase of molasses and rum on the return voyage. Fluctuations in the price and sale of any component of the

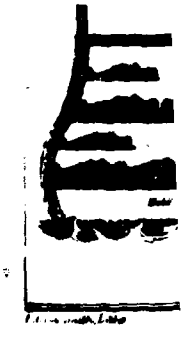
triangular network affected the financial outcome of slave trading ventures. More important, almost always throughout this period, slaves and rum were in as unnaturally short supply at ports of loading as they were in high demand at ports of landing. Highly variable periods of waiting for cargo was a major cost factor, and an unpredictable one, in the triangular trade.

15. Evaluation

In considering the material presented above, it should be recognized that in spite of high mortality rates and the horrors of the Middle Passage the African slave trade existed as a highly profitable venture over a long historical period. The objective of the slave traders was to get the maximum number of persons from Africa to the plantations in the Western Hemisphere with the limited cubage available in their vessels. The health of the slaves at their final destination was a major factor determining profits. To the extent that the traders were economically motivated, and to the extent that experience taught them what economically was the most feasible practice, they would have acted to ensure the survival of a certain percentage of slaves landing in the New World.

Apparently, they operated with the conviction that their economic interests were best served by loading close to the limits to which physical space could hold human bodies. Slavers resisted and evaded legal regulation that would have required space allocations of about 25 to 30 cubic feet per adult male; finding more profit in "spoonwise stowage" which required only six or seven cubic feet.

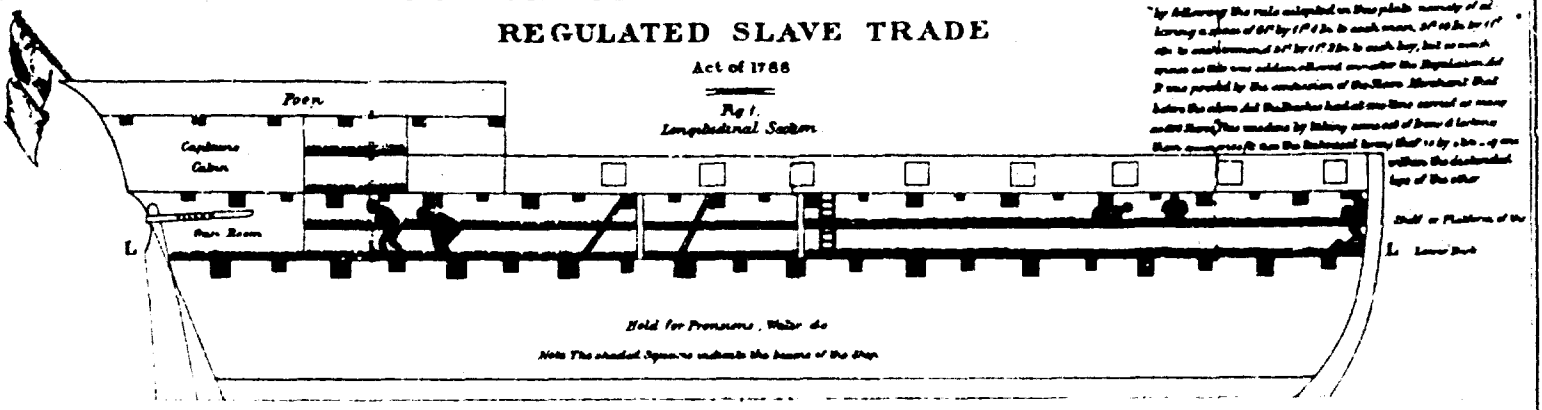
The slave ship (as would be the case with shelters where, when and if the numbers requiring shelter far exceeded available shelter capacity) had the function of maximizing the number of individuals who would be alive and functioning at the end of a passage of a few weeks to an unknown, terrifying future.



STOWAGE OF THE BRITISH SLAVE SHIP BROOKES UNDER THE REGULATED SLAVE TRADE

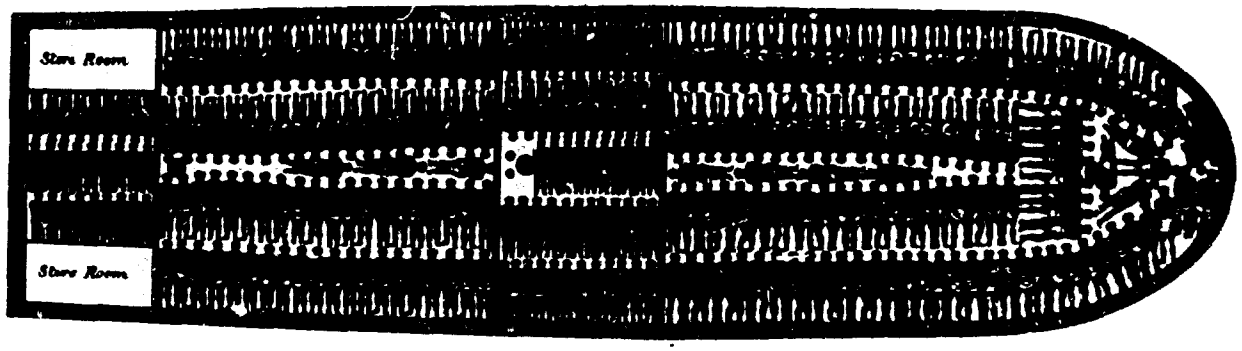
Act of 1788

Fig 1.
Longitudinal Section



PLAN OF LOWER DECK WITH THE STOWAGE OF 292 SLAVES
130 OF THESE BEING STOWED UNDER THE SHELVES AS SHEWN IN FIGURE 3 & FIGURE 5.

Fig 2



PLAN SHEWING THE STOWAGE OF 130 ADDITIONAL SLAVES RAISING THE WINGS OR SIDES OF THE LOWER DECK BY MEANS OF PLATFORMS OR SHELVES (IN THE MANNER OF GALLERIES IN A CHURCH) THE SLAVES STOWED ON THE SHELVES AND BELOW THEM HAVE ONLY A HEIGHT OF 2 FEET 7 INCHES BETWEEN THE BEAMS: AND NO LESS UNDER THE BEAMS. See Fig 1

Fig 3

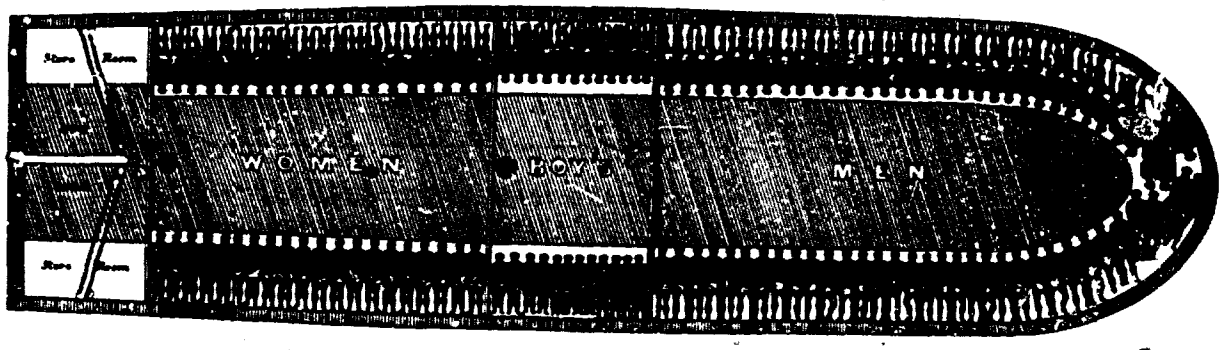


Fig 4
Cross Section at the Poop

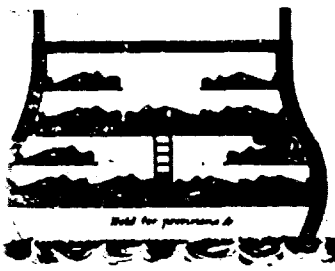


Fig 5
Cross Section amidships

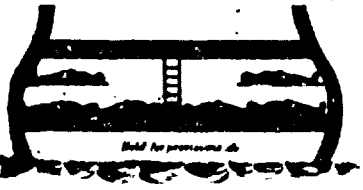


Fig 6
Lower tier of Slaves under the Poop

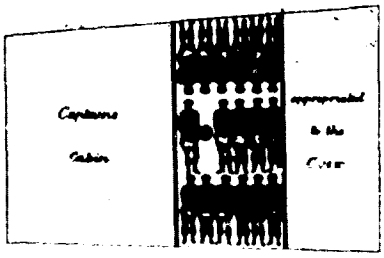
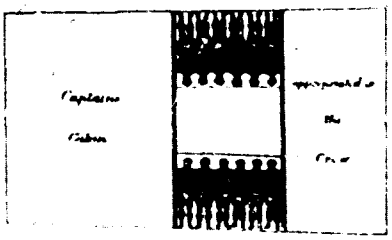


Fig 7.
Shelf tier of Slaves under the Poop



MEMORANDA OF THE NUMBER OF SLAVES COMPUTED TO HAVE BEEN EXPORTED AND IMPORTED WESTWARD FROM AFRICA FROM 1788 TO 1848*

Date	Number of Slaves Exported	Average Casualties During Voyage		Imported Into			Total Import
		Average Proportion	Amount	Spanish Colonies	Portuguese Colonies	Other Countries	
1788	100,000	14%	14,000	25,000	18,000	44,000	86,000
1798-1805	85,000	14	12,000	15,000	20,000	38,000	73,000
1805-1810	85,000	14	12,000	15,000	25,000	33,000	73,000
1810-1815	93,000	14	13,000	30,000	30,000	20,000	80,000
1815-1817	106,600	25	26,600	32,000	31,000	17,000	80,000
1817-1819	106,600	25	26,600	34,000	34,000	12,000	80,000
						Captured by Cruisers	
1819-1825	103,000	25	25,800	39,000	37,000	1,200	77,200
1825-1830	125,000	25	31,000	40,000	50,000	4,000	94,000
1830-1835	78,500	25	19,600	40,000	15,000	3,900	58,900
1835-1840	135,800	25	33,900	29,000	65,000	7,900	101,900
1840-1845	43,400	25	10,800	7,000	22,000	3,600	32,600
1846	85,700	25	21,400	1,500	60,000	2,733	64,233
1847	88,000	25	22,000	1,000	60,000	3,967	64,967
Totals	1,235,600						965,800

* Great Britain, House of Commons, Sessional Papers, Vol. 22, Second Report, p. 179.

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APPENDIX B

CROWDING ABOARD EMIGRANT SHIPS

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CROWDING ABOARD EMIGRANT SHIPS

1. Sources

The review of literature has focused on material relating to emigration departing for the United States and Canada from the British Isles. Works were sampled from the inception of major immigration in 1820 to the restriction of immigration by the U. S. Act of 1921. A large number of 19th Century sources with relevant material were located in volumes indexed under the subject of immigration because the need for reform of conditions aboard ships became a subject of official attention during this period. Shipboard conditions apparently received lesser attention in discussions of immigration after 1900, although steerage passage remained throughout a condition of extreme crowding. A few personal documents (Bolitho, 1939, p. 69ff; Brandenburg, 1903, p. 25ff; Haskin, 1913, p. 66ff) are reproduced in works indexed under immigration, but, doubtless, there is considerable material about conditions in steerage in other personal documents that cannot be identified from indexes or bibliographies on the topic. Conditions among steerage passengers received renewed public attention on a number of occasions when unusually scandalous episodes occurred, such as the death of 14 infants in one voyage of a German ship (see below). Concern with immorality on shipboard was prevalent throughout the entire century. One report by a woman investigator who took passage as an undercover investigator of "immorality" is recorded in a Senate investigation (U.S. Senate, 1911).

Crowding is uniformly mentioned in discussions of the emigrant ships and a number of sources go beyond this to give specifications of crowding and associated conditions that are useful for the present purpose.

Since sources on steerage conditions were located in reference shelves under the general category of immigration, additional time was required to identify pertinent data on crowding in emigrant ships. In the preliminary review, official proceedings, books, autobiographical data, and periodicals were checked. About 25 works with useful information were abstracted during the three man-weeks that were devoted to searching this topic.

2. Background

Large-scale emigration to the North American continent began with Irish immigrants in the decade 1820-1830. During the next 100 years, 31 million emigrants arrived in the United States from Europe. Emigration to the United States reached its peak in 1907—1,700,000 immigrants arriving in that one year.

In the early 19th Century, the sailing ship passage to North America ordinarily took from six to eight weeks, but unfavorable weather on some occasions increased the time to 11 weeks (Woodruff, 1934, p. 365). The introduction of steam lowered the time to two weeks in the 1850's and '60's (Morison, 1940, p. 459).

British emigrant ships were subject to regulation beginning with the British Passenger Act of 1803. A comprehensive regulatory

act was passed in 1835, repealing a number of previous statutes (Woodruff, 1934, p. 365). At the outset, passengers were defined more or less as "dead cargo" and the regulations did not extend beyond providing a maximum passenger-to-tonnage ratio (Turner, 1881, p. 4). The scope of regulation gradually was extended (with some retrograde steps along the way) to where it encompassed more elaborate definitions in terms of net space for accommodations, along with provisions regarding ventilation, water, food, hygiene, safety, and the maintenance of good order. Other principal nations also subjected their ships to regulation. As the following discussions indicate, these regulations were frequently honored in the breach.

The United States, as the receiving country, was far more concerned with the welfare of immigrants than were the countries they were leaving. As a consequence, American regulations were stricter (Woodworth, 1873, p. 10).

The substance of these regulations will be discussed for each of the major variables we are considering along with information acquired regarding actual conditions aboard ship.

The high pertinence of this literature to the present topic stems from the recurrent importance attached to habitability problems of the steerage passenger in reform agitation and official inquiries. Some of the original answers to the many questions concerning the requirements of confined humans for space and ventilation date to attention arising from concern with the conditions aboard these ships.

3. Environmental Features

a. Space. As has been indicated, the focus of complaint and of early regulatory measures was on the concept "overcrowding." If sufficient space was required, it was implicitly assumed, most of the other sources of fatality, as well as of disease, misery, and immorality would take care of themselves. In the 1840's, for example, American statutes prescribed the limit of passenger loading as being two passengers to every five tons. The penalty for exceeding the limit was a fine of $150 for each passenger carried in excess of the ratio. The vessel was forfeit to the U.S. if the excess was 20 or more. The statute also prescribed the minimum stores of food and water to be carried for each passenger, but, as Turner (1881) commented:

> . . . no note is made of cleanliness, ventilation, the daily allowance of food, its cooking, the sleeping apartments, discipline, or any thing that exhibits the least trace of care for the health of the emigrant, beyond a supply of water. . . (p. 4).

The development of regulatory measures increased the attention given more specific aspects of habitability, but the focus remained on the simple problem of adequate space throughout the century.

Approximately one out of every 12 of 575 vessels checked on arrival at New York during a nine-month period of 1880 were found to be loaded in excess of statutory limits (Turner, 1881, p. 10). (The limit at the time was 14 square feet of deck space per passenger.)

In the works reviewed for various countries at various times, government regulations of space allocation per steerage passenger

ranged from 12 square feet gross to 16 square feet net per person, where minimum heights were present (6 feet). The allocation was to be 20 square feet for an American ship, if the vessel passed through the tropics (Turner, 1881, p. 4). Regulations first provided for computing maxima by tonnage ratios, then by superficial deck space and finally by cubic feet of air space and minimum sleeping area.

There are a great many descriptions of the gross dimensions of steerage quarters in the literature covering the various periods, and of the arrangement of the accommodations within them. The following are illustrative passages:

> In a compartment from nine to ten feet high and having a space no larger than six ordinary-sized rooms, were beds for 195 persons, and 214 women and children occupied them (Brandenburg, 1903, p. 175).

> "Three hundred passengers," I explain, mentally, "there will not be room for them to stir." . . . I feel circumscribed in limit above deck; but, in the steerage cabin below, my feeling is simply suffocation. . . . The steerage is a low narrow apartment, with a very narrow, immovable table and two benches running its entire length; the height is more than the minimum required by the act which is six feet, yet it makes me almost afraid of walking upright; . . ." (All the Year Round, March, 1862, p. 112).

There are numerous references to sleeping arrangements and sleep behavior in steerage. Mid-Nineteenth Century steerage conserved sleeping space by berthing four to six people in the same area. Sleeping berths for the emigrant ship, Washington, are reported to be ". . . a shelf along each side of the whole length of the two decks, with low boards dividing the shelf into berths all of one size and each containing

from four to six persons" (Chamber's Edinburgh Journal, 1851, p. 27). Similarly, sleep accommodations of an emigrant ship in 1862 consisted of ". . . a number of little closets, not half so spacious as our country pantries, but looking very like them, with substantial shelves, about twenty inches wide, two on each side, and two along the end; . . . the whole space for standing in them is six feet by three, for six persons. . ." (All the Year Round, March 1862, p. 113).

b. Ventilation. Although there were official investigations and inspections to ensure observance of statutory regulations, we have not located precise data from them on air and temperature characteristics below decks in the immigrant ships. The reason for this is that the inspections were made in port and, according to a U.S. Public Health and Marine Hospital Service report of 1873, the masters of vessels usually subjected them to "a thoroughgoing purification during the twenty-four hours immediately preceding . . . arrival" (Woodworth, 1873, p. 17). Although a Senate resolution had demanded a complete chemical analysis of the air in the steerage of ships as a part of an investigation of immigration, the agency considered that this would be misleading were it not carried out at sea and without warning. Instead, the Public Health officials made inferences from the nature of the ventilating apparatus and the characteristics of the passenger accommodations. It concluded that ventilation on sailing ships only approached adequacy when there was a fresh breeze, but it frequently was indaequate ever under these circumstances because passengers would

block the openings of air tubes, throttle the wind sails, and close side ports to avoid uncomfortable drafts. Ventilation was far superior on later steamships, which used exhaust air pumps, and to this factor, among others, the 1873 report attributed the far lower mortality rates among immigrants on the newer steam ships (Woodworth, 1873, pp. 20-21). Considerations relating to ventilation led to recommendations by Navy and Public Health surgeons of a 400 cubic foot minimum for statutory marine passengers (Turner, 1881, p. 12).

c. Temperature. No quantitative reports of temperatures in steerage were found. We know merely that steerage quarters were generally hot, from qualitative descriptions such as the following one:

> I myself though tolerably strong, found when I descended into the steerage deck, after the passengers had been on board a single night, that it was so hot (though the day was warm), that it was like going from the open air into an oven, and though I had nothing the matter with me, I could not remain there without a sense of suffocation above half-an-hour (Great Britain, House of Commons, 1851, V. 19, p. 315).

d. Sanitation. American law introduced detailed sanitary provisions in May, 1848. Masters were charged with responsibility for ensuring "such habits of cleanliness . . . [among the passengers as will] tend to the preservation and promotion of health" (Turner, 1881, p. 5). The number of water closets per passenger was prescribed as were the compulsory mustering of passengers above deck in good weather for airing of bedding, and the use of disinfectants. The literature indicates that these regulations were observed vigorously only during the hours immediately prior to port inspections.

Surgeons were required on immigrant ships under earlier American statutes, with the option of loading to 12 square feet per passenger when carrying a surgeon or allowing 14 square feet and dispensing with the medical man. Later statutes required a small hospital for passengers.

e. Water. Early American statutes provided that 60 gallons of water were to be carried for each passenger on the Atlantic crossing--presumably sufficient for about three quarts per day of the slow sailing ship passage (Handlin, 1959, p. 37). In a few episodes of unusually harsh treatment of passengers by the captain and crew, water rations were reduced to half a pint of drinkable water per day per person.

f. Food. During the sailing ship period, emigrants generally supplied and cooked their own food. American statutes of various dates prior to 1855 prescribed the minimum amounts of provisions that had to be carried for each passenger, but these could be furnished by either the vessel or the individual passenger. While the minimum per passenger for the voyage included 100 pounds of salt provision, 100 pounds of "wholesome ship-bread," and a gallon of vinegar, the amount of the daily ration was not defined prior to 1847 (Turner, 1881, p. 4). British legislative hearings (1851) mention starvation occurring among passengers during a prolonged voyage, and Handlin (1959) records several episodes of deliberate starvation of the passengers by ship officials (pp. 33-37).

The space at the fires frequently failed to accommodate all the families separately cooking their food on the sailing ships and, except for a few who by bribery or brute strength got first turns, one cooked meal per day, at most, was all the immigrants could manage. On larger ships, about 15-20 passengers could cook at the same time. Eating of raw flour or meal was a consequence with resulting dysentery (Great Britain, House of Commons, 1851, xxiii).

The American statute of 1855 prescribed that the vessel was to furnish and prepare food and it specified amounts, variety, and intervals of messes (Turner, 1881, p. 6).

g. Social Interaction. Three major recurrent themes were found in the literature on the characteristics of life among the passengers in steerage: disorder, lack of privacy, and euphoria.

(1) Disorder: In the sailing ship period, thrown together and promiscuously intermixed in common quarters below decks, people were from many families, of both sexes, of all ages, and frequently of diverse nationality and language. To the onlooker peering into steerage from a gangway, the scene was typically one of pandemonium:

> The steerage was somewhat dark, but in the uncertain light a picture presented itself full of strange "effects." The floor was strewed with luggage, rendering it a matter of difficulty to walk—bundles, trunks, cases, chests, barrels, loaves of bread, sides of bacon, and tin cooking utensils seemed to be piled together in hopeless and inextricable confusion, while amidst them all scrambled or crawled a perfect multitude of young children. All the berths were occupied (Littell's Living Age, July, 1850, p. 493).

Similarly, another description:

> I look down from thence upon our less privileged shipmates of the steerage and intermediate, and see them involved in a distracting whirl of confusion, which continues hopelessly all the afternoon. There are people of every age, down to babies but a few weeks old; men shouting; children crying; women silenced by utter inability to make themselves heard. Luggage is strewed about the deck in unsorted heaps. Every spot is full; every square foot is littered; every person is in a ferment (All Year Round, Sept., 1862, p. 114).

Under conditions of steerage, crowding was a chief characteristic. Yet it had some advantages particularly in bad weather when the ship pitched, as described in the following passage:

> On reaching the steerage, I found myself in the midst of a scene that was equally ludicrous and distressing; all the emigrants occupied their respective compartments, many of which were so crowded that their inmates actually lay upon one another; and each, at the same time, in his anxiety to retain his place, totally disregarded the comfort and conveniences of his neighbours, and extended his legs and arms whereever he thought fit. As often as the motion of the vessel indicated that she was on the point of rolling violently, a general commotion took place among the emigrants—some clung to any objects that were within reach—others stretched themselves along the floor, and a third set tried to resist the anticipated shock by wedging themselves closely together (Blackwood's Edinburgh Magazine, Aug. 1821, p. 457).

(2) Lack of Privacy: The most immediate effect of the disorderly manner of loading the ships was an almost total disregard of principles of privacy and propriety in the earlier decades. Single women found they were assigned to berths with men (or, simply, there were no other berthing possibilities left for them). Single individuals were berthed alongside married ones—there being no separation in the

continuous shelving that frequently formed the beds—with a common blanket cover for all. Sexual promiscuity was reportedly the rule, and there are a few reports that no single woman on the vessel of the observer remained inviolate during the crossing (U.S. Senate, 1911, pp. 13-23). American law eventually required the complete segregation of single individuals by sex and separate berthing of different families (Turner, 1881, p. 8). The immigrants remained prey to assault and sexual exploitation by crews, however. As late as 1911, we have the following report:

> From the time the women went on board until they landed they did not have one moment's privacy. Not one young woman in the steerage escaped attack. The investigator herself was among these, and yet the steerage officials made no effort to punish the offenders. Some resisted for a time and then weakened; some fought with all their physical strength. Two refined Polish girls fought with pins and teeth. The atmosphere is described as one of general lawlessness and total disrespect for women, which naturally demoralized the women after a time (Haskin, 1913, p. 71).

With respect to sleep deprivation there are indications that women frequently preferred to stay up all night rather than sleep in the same bed with strange men. There are also indications of constant noise, shouting and yelling from all corners and ages. During the early period particularly, steerage compartments were unilluminated or, at best, very poorly lit.

(3) Euphoria: Distinguishing the immigrant ships sharply from almost all other events we have studied was the euphoria reported to have been prevalent among the immigrants. Most felt that they were

leaving hardship behind them. It is generally reported that the difficulties aboard ship interfered little with their excitement and anticipation of plenty in the New World. Good spirits, and sometimes boisterous ones, existed despite extreme crowding and privation (Littell's Living Age, July 1850, p. 493).

h. Duration and Continuity. With the introduction of steam in the late 1840's the sailing passage time of 6 to 8 weeks was reduced by three-quarters, better and larger ships gradually replacing outmoded sailing vessels. The transference from sail to steam on the trans-Atlantic route took place with unusual rapidity.

> By 1863, 44 per cent of the emigrants crossed in steamships; in 1867, 93 per cent; and recognised points of departure like the Clyde and Liverpool ceased altogether to send their passengers to America by sailing ships (Morison, 1940, pp. 459-460).

The difference in duration of passage between sailing and steam vessels is contrasted by Woodworth (1873); the average voyage of a sailing vessel in 1873 was 72 days, the crossing on a steam vessel, 19.9 days. The average number carried on the latter was 86.7 persons, as compared with 237 on the former. The contrast becomes more striking when assessing mortality rates.

> . . . of 34 deaths on the voyage, 2 only occurred on the steamships to 32 on the sailing-vessels being in the ratio of 1 death to every 22.2 passengers carried on the latter (Woodworth, 1873, p. 22).

Turner (1881, p. 10) records for the first nine months of 1880 a mean duration of passage across the Atlantic was 12.7 days.

On many occasions, the passengers were confined below deck during the entire journey. According to a select committee report of 1851, there was no space above decks on many vessels for the passengers to take air or to exercise. It stated: "The necessary consequence of this, is, that the emigrants, or the great part of them, are obliged to remain in the steerage deck during the whole of the 35 days, . ." (Great Britain, House of Commons, 1851, p. 315).

Evidence is inconclusive as to whether this is also as nearly universally true for steam vessels. Much depended on weather conditions, so that there were at least frequent instances throughout the century when passengers were below for the major part of the journey.

i. Population Characteristics. The emigrants were generally from northern and central Europe until 1880, after which East Europeans predominated. Given the absence of compartmenting, groups of up to 500 people were sharing common quarters. (See above.)

In 1880, the number of passengers carried by a ship ranged from 500 to 1300. All ages including families, children, and infants were found (Turner, 1881, p. 7). Steerage quarters often accommodated as many as 300 in a designated space (All the Year Round, 1862, p. 112). Most emigrant passengers, however, were youthful and hence, capable of withstanding the rigors of the crossing.

4. Impact

a. Mortality. Statistics on mortality are given in detail in the literature on emigrant ships. American law levied a $10 penalty on

a ship for every death of a person over eight years of age who died on the voyage (Woodworth, 1873, p. 10), thus providing some basis for record keeping despite the fact that the penalties were not actually applied (Turner, 1881, p. 9). During the early 19th Century, the average mortality per crossing among passengers on sailing vessels was in excess of 10 per cent. The introduction of steam ships eventually reduced the mortality ten-fold.

Woodworth (1873), writing at the end of a period of rapid shift from sail to steam, emphasized the effects of the much reduced length of passage in curtailing mortalities. He contrasted mortalities among immigrants on sailing ships and on steam ships occurring in 1867 and 1872:

PERCENT OF IMMIGRANTS DIED DURING CROSSINGS ON SAILING VESSELS AND ON STEAMSHIPS, 1867 and 1872

	1867	1872
Sailing Vessels	11.67	5.42
Steamships	1.03	.45

The sailing ship crossing, it is to be remembered, required about three times as long as the steam crossing. The halving of mortality on sailing ships over the five-year interval, he explains, by the competition of steam driving the smaller, slower, and less serviceable sailing vessels out of the service. In addition to reduced duration, the lesser degree of overcrowding in 1872 may have also contributed to the reduction of mortality. While the sailing vessels still in service in 1872 were the

larger ones, the average number of persons carried per voyage by these vessels was less than the average carried by all vessels in 1867—157 in 1872 as compared with 172 in 1857 (Woodworth, 1873, p. 22). Another factor may have entered into the situation that was not considered by Woodworth in making his comparisons between steam and sail. Steam crossings were considerably more expensive and those who could afford the higher fare may initially have possessed greater hardiness and resources for coping physically with the crossing.

Nonetheless, the preponderance of data and the long term trends indicate a real and high relationship between length of crossing and mortality. (See also Turner, 1881.)

At a time when steam was accounting for 43 per cent of the traffic from the British Isles, a British emigration commission found only 102 deaths among 230,531 passengers representing 545 voyages (Woodworth, 1873, p. 22). Using a 12-day estimate of the average voyage, this amounted to a mortality rate exposure of only 13.38 per thousand per annum, a figure below prevailing population death rates at the time. This is accountable for in terms of the very low average age of immigrants, but it still represents a surprisingly low figure. Disturbed by a feeling that such figures were inducing complacence about conditions aboard immigrant ships, Turner (1881), a reform-minded American officer, evaluated American figures showing 261 deaths among 228,722 passengers as implying a mortality exposure of 35 per thousand per year; which he claimed was three times the prevailing total population death rate for the 1870 U.S. census. He further stressed the youth of the immigrant

population. For our present purpose, however, the most significant fact is that under conditions of passage which, from our present perspective, were uniformly highly overcrowded, the criterion for evaluating mortalities was no longer some standard of atrociousness, such as the Middle Passage, but rather was normal population mortality rates.

b. Morbidity. Prevalence of the following diseases in the steerage passage is mentioned: diseases described as produced by "ochlesis,"[1] or "crowd-poisoning," cholera, relapsing fever, smallpox, and more especially typhus or ship fever, ". . . continued fevers, boils, erysipelas, malignant ulcer, ophthalmia, pyaemia, septicaemia, bronchitis, consumption, and a general impairment of the health. . ." (Turner, 1881, pp. 10-11).

Isolated incidents of fever-ridden ships occurred during the Atlantic passage. In 1846, a dysentery epidemic of major proportions affected British ships. Among 106,812 passengers bound for Canada that year, it caused a total death rate of 16.33 per cent, including deaths in quarantine hospitals at debarkation points (Great Britain, House of Commons, 1851, p. 4). According to the report given to Land and Emigration commissioners, the high death rate could not be attributed to crowded conditions aboard ship.

> On this side of the Atlantic, every endeavour continued to be made throughout the season to arrest calamity, but, unfortunately, without success. With scarcely an exception, in every vessel that sailed

[1]Ochlesis--Morbid conditions induced by the crowding together of many persons under one roof.

> from infected ports, the fever, though latent at the time of sailing, required but a few days and possibly also a change of diet to develop itself. Nor was the vulnerability to disease dependent upon the circumstances of the vessel, since vessels carrying pensioners from an infected port and sailing under the most favorable circumstances, suffered as much as crowded emigrant ships from the same port. At the same time, the most crowded emigrant ships from healthy ports escaped (Great Britain, House of Commons, 1851, p. 4).

Another incident in which the causes of mortality were believed to be directly attributable to overcrowding in steerage occurred aboard the steamship Ohio. Out of 1,342, 13 died during the passage. The deaths were primarily of infants less than a year old (Turner, 1881, pp. 9, 62). Deaths were sudden and not caused by the outbreak of a contagious disease; rather, atrophy, catarrh, pneumonia were listed as the principal causes. According to an affidavit written by a passenger whose two-year old died on the trip, "The air was so foul and close she thought that was the cause of the child's death" (Turner, 1881, p. 62).

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APPENDIX C

RELOCATION OF JAPANESE-AMERICANS

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RELOCATION OF JAPANESE-AMERICANS

1. Background

By Executive Order of February 19, 1942, the U. S. Army was given authority to establish military zones from which aliens or citizens could be evacuated. Japanese nationals and persons of Japanese descent were those most directly affected and were required to evacuate their homes on the West Coast. Their relocation has been referred to as the "largest, single, forced migration in American history" (McWilliams, 1942, p. 15). Since only a few internment camps were ready for occupancy in the spring of 1942 when the evacuation was ordered, temporary accommodations were set up in the 15 so-called Assembly Centers at race tracks and fair grounds near the principal areas of Japanese-American population. With the exception of approximately 10,000 people, evacuees spent periods ranging anywhere from six weeks to six months under an Army agency before passing to the Relocation Centers, which were administered by the War Relocation Autnority, a civilian agency. Ten permanent Relocation Centers to house evacuees were established in remote, barren regions of the Southwest and Northwest. At these, housing for 105,750 persons was hastily constructed following specifications for theatre-of-operations barracks.

From most standpoints, the experience of the Assembly Centers, such as the Tanforan and Santa Anita race tracks, bears far greater comparability to the present problem than the later Relocation Centers.

For most evacuees, it marked the initial break with ordinary existence. The duration of confinement, while generally considerably longer than that currently foreseen for civil defense emergencies, was far more comparable in order of magnitude. Problems associated with the rapid assembly in a confined situation of a heterogeneous civilian population were involved. Space was more limited. Further, the psychology of evacuees in Assembly Centers partook more of the quality of a very temporary period of transition from ordinary existence to an indefinite and threatening future, while at least many of the evacuees gave some credence to the official definition of the Relocation projects as attempts at developing permanent communities. It is consequently unfortunate for the purposes of the present study that the Relocation Centers were studied and described intensively and that only sparse material on the Assembly Centers could be located.

As contrasted with almost all of the other types of events examined in the course of the present study, the Relocation Centers provided lavish allocations of space per person. By standards applicable to all of the other classes of events described herein, the Japanese-American evacuees can hardly be said to have been "overcrowded." By the standards that participants felt were applicable to their situation, however, they were indeed "overcrowded." The literature on the camps, as a consequence, was regarded as a valuable source of information of psycho-social aspects of "overcrowding."

2. Availability and Nature of Source Material

The literature on Japanese internment comprises governmental surveys, sociological studies, and a number of autobiographical sketches. Thomas (1952) has published 15 detailed life histories. Since much of the data comes from governmental sources and systematic scholarly studies, their accuracy and validity is judged to be high. Material on Japanese Relocation Centers is of unusual interest because of the availability of sociological studies of group relations in the Centers.

3. Environmental Features

The Relocation Camps were all located in areas that had been inhospitable to human settlement in the past:

> Each of the ten sites was relatively isolated. The six western projects were wind and dust swept. Tule Lake, Manidoka, and Heart Mountain were subject to severe winters. Poston and Gila, both in the Arizona desert, had temperatures well above 100 degrees for lengthy periods, and Rohwer and Jerome experienced the excessive humidity and mosquito infestations of swampy delta land (Thomas and Nishimoto, 1946, pp. 28-29).

In the Relocation Centers, the block, composed of fourteen barracks, was the basic unit of the evacuee community. Barracks were divided into individual apartments, intended primarily for sleeping quarters; no kitchen, water faucet, shower or toilet was attached to an apartment. For these latter needs, communal facilities were provided on a block basis. Each block had a mess hall, a recreation hall, public toilets and shower rooms for men and women, a laundry room, and

an ironing room. A block was originally designed to house 250 evacuees but the literature cites numbers up to 800 being housed within a block.

a. Space. Sources are unanimous regarding the degree of crowding in living quarters. The dimensions cited in the data are almost identical for every source read. Barracks were 20' x 100' and were divided into apartments of either 20' x 25' or 16' x 20'. Although the housing plan in the Centers presumed the preservation of the family unit, space limitations often required compromises with that original intent. Unattached individuals and couples were often housed with family groups. More than one family was frequently assigned to the one room which formed the apartment.

> Crowding meant specifically, families of four or more living in 20' x 25' single rooms, couples unacquainted with one another living together in one room, a family of three or more sharing a room with one or more individuals, 20 or 30 single men living all together in an unpartitioned barrack (War Relocation Authority, 1946, p. 62).

Sources indicate that no furnishings were provided for the occupant with the exception of a stove placed in the middle of the apartment and, in some instances, cots and blankets. Internees resorted to sheets, blankets and other improvised screens to provide some privacy. A typical observation of the impact of crowding on family life is:

> We have tried to rearrange the house today. I suppose not much can be done with 20' by 25', but we always hope against hope that we can. Goodness, we certainly could stand just another room. This being seven in a room makes privacy an unknown word (War Relocation Authority, 1946, p. 63).

For the evacuees, crowded housing also meant "disorganization of family life, frayed nerves, friction and discomfort from which there was no relief" (War Relocation Authority, 1946, p. 63). Organization of living space, management of available space, and the impact of crowding on group relations are set forth in a fairly detailed manner in the source material covered.

b. Air and Temperature. Humidity, air and temperature ranges varied, differences being dependent on the location of the camp. Ventilation did not pose problems and is not alluded to in the data covered thus far. There is some indication that heat contributed to the rise of tension and irritation. Cold and dust storms were additional sources of discomfort.

c. Food and Drinking Water. References to food and water relate to anxieties over possible contamination and shortages, rather than to actual inadequacies. Some of the data point to a readjustment problem regarding diet, particularly among certain elements of the Japanese community, large segments of which were completely unaccustomed to the types of food served. Generally, food complaints appeared to be correlated with anxiety: i.e., "specks of dust in the water, or strange tastes in the food brought strong agitated complaint regarding health protection" (Leighton, 1944, p. 118). Disputes concerning responsibility for poor food preparation and for misallocations and misappropriation of food were the major focuses of dissention.

Food preparation at many places was in the hands of individuals with no experience.

d. Health and Medical Care. No factual data on medical and health care were found, other than mere mentions that such facilities existed. There were frequent rumors about health hazards, extreme examples being that evacuees were being used experimentally in the hospitals and that Causasian doctors were deliberately allowing evacuees to die (War Relocation Authority, 1946, p. 65).

e. Sanitation and Disease. Only one or two comments were found on incidences of contagious diseases. Dysentery was a frequent complaint. Hygiene and sanitation conditions presented little objective hazard, but fell far short of the standards to which most evacuees were accustomed.

f. Work Demands. Governmental sources reveal that many internees held paid jobs with the camp administration and others performed maintenance and farm labor. Pay was almost inconsequential, and there was intense resentment about rates and inequities in remuneration. Most work available was unattractive. Most non-administrative jobs involved hard labor under fairly harsh climatic conditions and was low-status work. For other individuals, "Life amounted to waiting for the next meal" (Mine Okubo, 1946, p. 64). Animosity was directed at the early volunteers who held jobs in the camp administration. Among the women internees, evidence exists that the initial impact of camp life led

to self-imposed business involving activities toward making living accommodations as comfortable as possible. After such efforts had about exhausted the potential of improvements, work interest petered off. One source reports that for the women "new abundance of leisure resulted in loss of interest and boredom" (War Relocation Authority, 1946, p. 69). In some Relocation Centers, the system of organized education and recreation became the most effective time-filling device.

g. Social Interaction. The literature describes some violence both among the evacuees and toward the camp administrators. Episodes of gang warfare are cited in the literature which are interpreted by the sources as resulting from the alignments of cliques on the question of cooperation with or defiance of the administration.

Cleavages on nativity lines, paralleling largely generational lines, and between American- and Japanese-educated younger people are reported. Changes in positions of power, prestige and effectiveness within the camp structure are elaborately described.

Many of the social and behavioral problems noted in the literature may be explainable by the shift of a large proportion of all social interaction from intra-family to extra-family contacts (see 6.c., below). While not crowded to any degree from the standpoint of the requirements of physiological health, family living quarters were too cramped and lacking in privacy to offer a setting for many "normal" family activities. Mess-hall eating, community recreation, and formal and informal associations organized on age, nativity, political, and special interest

bases resulted in considerably larger portions of the "life space" of evacuees being occupied by the extra-familial much more than was the case during peacetime.

h. Communication and Rumor. An enormous role in camp life is ascribed to rumor. There are reports on the types of rumor, the reasons for the prevalence of rumors, and their impact on the internee. Rumor material, according to one source, owed its prevalence to the uniqueness of the Japanese-American camp situation: ". . . at every center, the uncertainties of the new life and the intense concern about present and future welfare led to the construction of a shifting and fanciful world of additional uncertainties and distorted human relationships, to more fears, and to further distrust" (War Relocation Authority, 1946, p. 65).

i. Privacy. Lack of privacy is reported by internees to be felt most keenly in the early days of camp living. Privacy was not only lacking in individual apartments; auditory privacy within a block unit was impossible because of the flimsy barrack construction of shiplap covered with tar paper. An internee's comment on privacy appears to be representative of the data: "There was a lack of privacy everywhere. The incomplete partitions in the stalls and the barracks made a single symphony of your and your neighbors' loves, hates, and joys. One had to get used to snores, baby-crying, family troubles, and even to the jitterbugs" (Mine Okubo, 1946, p. 66).

j. Psychological and Social Traumata. There are references in various materials as to the personal trauma experienced by the internee. There are detailed discussions of reactions to degrading experiences, family separation, threats to, and confusions of, identity, uprooting from community and occupation.

West Coast Japanese-Americans had been experiencing intensely humiliating, deprivational, and threatening events for a considerable period prior to their compulsory evacuation. There had been harsh propaganda directed against them, economic discrimination that seriously affected most of their livelihoods, and official restrictions such as curfew measures and control of their free movement. While for most, particularly the Nisei, internment in reception centers was a far more intensely shocking experience than anything that preceded it, nonetheless the increasingly hostile atmosphere they had been experiencing allowed many for a time to rationalize the evacuation measure as being one for their own protection. Many welcomed leaving the coastal area.

This proved to be a short-lived basis for the initially benign and cooperative attitude most evacuees had toward relocation authorities. Although a large residuum of cooperativeness remained among them, involving both the attempt to make the best of a bad situation and demonstrations of unjustly impunged loyalty to the nation, the attitude toward the relocation episode became quite universally one of intense resentment.

The following quotations illustrate how frustrations and uncertainties of the immediate situation spilled-over into generalized attitudes toward the larger context:

> The crowding was an important factor in the background of most that happened during the first months. It contributed to the prevailing state of mind and the mounting tensions in the early centers. It was, however, around the other two basic interests--food and health--that most intense feeling crystallized. At the roots of anxieties lay the experiences of the months since Pearl Harbor. Most important was a deep distrust of the Government and of the Caucasians who composed it and in whose hands evacuees now felt themselves to be. If "they" had conceived and carried out the evacuation of families and children, if "they" had picked up and separated from their families family heads who people knew were not dangerous, if "they" had conceived the relocation centers with their restrictions and subordinations, how much consideration could be expected from "them" now? If "they" had done this much, what more might "they" not be expected to do? All the necessities of life were now in the hands of the distrusted group, represented by the WRA staff in the centers. The relocation centers were in remote and isolated spots off the main transportation lines. Here was the perfect setting for harsh treatment, if that were in the minds of the Caucasians. If the war overtaxed the transportation system of the country, the relocation centers would be the first to be cut off. What would happen to the food supply then? Perhaps, some said darkly, it had been the intention all along to get rid of the evacuees in this way. These suspicions, not yet known to the staff and incredible if they had been, were deep, and based on real experiences. They gained wide currency in the early centers (War Relocation Authority, 1946, p. 64).

> As the residents stood around the fires warmed by the flames and the fellowship, there was an atmosphere conducive to group solidarity to rumination on grievances and the reinforcement

> of resentments by mutual exchange. It was easy for the mind to travel from the absence of stoves to other things. The mosquito screens had been in the warehouse for months, but had not been released until the mosquito season was over. . . . And so it went--narrow, in-growing thoughts back over the whole string of "injustices," the formerly poor food, the previous lack of medical care, the tragedies of evacuation, piling one thing on top of another to create accumulation of indignation that grow into monsters out of all true proportions (Leighton, 1945, pp. 154-155).

> Last Tuesday we were suddenly ordered to this center from the Mayor Assembly Center***. Government showed poor judgment in sending clean-living Japanese to this dump. The whole affair reveals lack of careful planning, lack of foresight, and utter ignorance of Japanese psychology. Authority are asking for cooperation and suggestion, I understand, but such will not be forthcoming***. I can see no evidence of the much vaunted American sense of fair play, sportsmanship, et cetera. The Nieseis are sore because no distinction has been made between Isseis, and grumble that citizenship doesn't mean a damn thing. The Isseis are laughing at the dumbness of the Americans in treating us this way. The whole mess is rotten, as far as we know (War Relocation Authority, 1946, p. 43).

4. Duration and Continuity

While cases varied considerably, the majority of the cases involve approximately three years of internment. Two-thirds of the evacuees remained in camps until the recision of the exclusion orders in December, 1944 (Thomas, 1952). The uncertainty of duration and how this was experienced by internees is a recurrent theme of the reports. There is extensive material on post-crisis adaptations and effects (Bloom and Riemer, 1949).

5. Population Characteristics

The camps ranged in size from 6,000 to over 14,000. They included members of both sexes of all ages, but a very unusual "hour-glass" distortion of the age-sex pyramid existed. Among the Japanese, a broad variety of social classes, religious groupings, and occupational backgrounds was present. There was extensive mixing of heterogeneous population elements:

> A typical block of country people might contain 8 to 10 families of well-to-do farmers, 15 or 20 itinerant farm laborers, a dozen or more families of poor tenant farmers, a few small shopkeepers, possibly a dentist and his family--people who had lived according to widely different economic standards, who had gone to different churches, and who perhaps belonged to none of the same organizations. No block had from the beginning a background of common participation of all its members in some former community. Every block had on the contrary a background of differing class, religious, and family behavior (War Relocation Authority, 1946, p. 67).

Material also exists which describes living conditions of the Japanese in their home communities before internment.

6. Impact

a. Individual/Physiological Practically no significant data were found in this category.

b. Individual/Psychological. There is manifold information on the psychological impact of internment, both on an individual and a group basis. Individuals experienced a wide range of responses to the internment situation. With respect to relations with camp

authorities, this ranged from active cooperation through deliberate withdrawal to outright defiance. Fear, frustration and anger are some of the attitudes portrayed in the literature, as well as apathy, submissiveness, and withdrawal behavior. A widespread reaction is reported as follows:

> In the Center, withdrawal from painful contacts, lying low, not "sticking your neck out," were, perhaps, the most widespread of all reactions (Leighton, 1945, p. 265).

In addition, many instances of opposition to camp officials and agressive behavior are reported in the literature.

Frustration is described as a common occurrence at the internment Centers:

> Frustration was characteristic of evacuee existence. Being moved from the West Coast to a Relocation Center interrupted jobs, careers, education, family and social life. . . . After reaching the Center, the people found that day-to-day living was filled with great numbers of additional frustrations. The water supply would be cut off when one was most in need of a shower, noisy neighbors would prevent sleep at night, room-mates interfered with personal habits, attempts at work were hampered by inadequate equipment, wages were not paid on time, etc. . . . Many of these irritations were minor, but their frequency and persistence often made them harder to bear than the major deprivations (Leighton, 1945, p. 260).

c. Impact/Group. By far the most extensively discussed aspect of the effects of internment was disorganization of the family. Indications are that the loss of the accustomed roles and functions was responsible for the deterioration of family ties. The solidarity which developed during the crisis of evacuation and relocation

disintegrated at the Centers, as there were limited opportunities for collective action, few decisions to be made, and little work to do.

> The father's authority as head of the household lost much of its functional character, the age-hierarchy was all but destroyed, and group purposes disappeared. . . . Each member became a free agent, and small children detached themselves from parental supervision, returning to the home barracks perhaps only to sleep (Bloom, 1943, p. 558).

Similarly, "Mothers had lost all control over their children" (Mine Okubo, 1946, p. 89).

Communal aspects of living are blamed for the interference with customary family ritual:

> Dining room, lavatory, and recreation room were all communal, and hence every home was broken into three or four distinct places, with all but the room in which the family slept shared by 60 or more other families (War Relocation Authority, 1946, p. 69).

Lack of family privacy was to make the rearing of children a public affair:

> The worst part of it is not being able to bring up the baby right (War Relocation Authority, 1946, p. 68).

> A constant refrain in the early days of the centers was that children were getting out of control, that family life was breaking down (War Relocation Authority, 1946, p. 69).

Nonetheless, other interpretations (e.g., Leighton, 1945) attest to the remarkable strength of family organization and control in the face of these disrupting influences.

Loss of role structure is said to have brought tension and anxiety, as well as insecurities about life itself. As a consequence, according to one governmental source, trivial things had the unexpected powers of arousing emotions. Assaults, agressive behavior and tension were traced to the disappearance of former standards. New bases for group realignments in the internment situation are described. One such element was resentment against confinement. Shared grievances reinforced resentments and helped establish new group structure. A kind of leveling process--"we are all in the same boat:--affected social relationships.

Governmental sources confirm the existence of great tension. Camp officials feared that the slightest incident could igrite a camp into agressive action. Tension, an author pointed out, was the unavoidable consequence of the limited control one could exert over one's environment.

Much data exists on accumulated tensions. Some sources point to crowded living conditions as a cause of tension where people of different personal habits found themselves living with one another. Another cause of tension was the leveling of role status--i.e., people found themselves taking orders from individuals whom they considered to be their inferior. Tension, reports one source, was the ". . . fundamental part of the uneasiness which came from people finding each other's behavior strange and unpredictable" (Leighton, 1945, p. 234).

An ultimate effect of the loss of function, role, etc., was the emergence of synthetic group organization, a kind of artificial way of life which was based on the crisis of camp life

d. Mortality and Morbidity Rates. No useful information was found in the literature on these subjects. The unusual age structure of the community would make invalid comparison with preinternment mortality data for the same population, except on the basis of age-specific rates. Such were not available.

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APPENDIX D

SYSTEM OF CONVICT TRANSPORTATION

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1. Background

The involuntary export of convicted persons to British overseas colonies was a well-established practice in England during the 18th and 19th Centuries. Australia became the dumping ground for Britain's felons for almost a hundred years; the first criminal colony being established in 1788, the last convict ship to reach its shores arriving in 1868. During that span of years, 160,663 convicted persons were relocated in Australia. The length of the voyages varied from 127 to 156 days. The material collected pertains largely to the early period of convict transport.

2. Source Material

Historical analyses of transportation (convict resettlement), governmental inquiries and scholarly texts comprise the materials scanned on this topic. Two diaries of convicts are reported in a secondary source, but are not available in the United States. Pertinence of sources available to this topic was evaluated as moderate to high with some biases detected toward dramatizing the unfavorable conditions of the sea voyage. Some ten sources provided the bulk of the useable data.

3. Environmental Features

a. Space. Vessels chartered for convict service were all square-rigged and except for a few brigs were ships or barques. The majority ranged from 200 to 600 tons. Loading was supposed to be limited to one prisoner per ton, but examples of illegal overloading can be cited from the literature (Bateson, 1959, p. 124; Scott, 1940, p. 418). The overcrowding of prisoners in the ships' quarters is also profusely discussed. The standard dimensional design of a prison ship is described as follows: 75 feet long, 35 feet broad (at its widest) with an average height between decks of 5-1/2 feet. The prison quarters were usually located on the orlop or third deck. Prisoners were thus well below the water line. In land prisons, the legal allotment of space per prisoner at the time was 27 cubic feet of space; and, although the same minimum applied in theory at sea, prisoners were usually packed more densely than this on ship. One source (Bateson, 1959, p. 124) reports, however, that a convict ship embarking with 433 prisoners was ordered to unload 33 convicts because allotment of space would fall below the standard of 27 cubic feet per individual.

A prison ship constructed in the 1820's was designed to allow two rows of sleeping space, one above the other, extending on each side of the between-decks, each berth being six feet square, and calculated to hold four convicts (Bateson, 1959, p. 59). But an example of an actual instance shows even greater overcrowding occurred:

> A berth about five feet six inches square was all that was allowed for six men to occupy day and night with the exception of an hour in the morning and an hour in the afternoon each day on deck for air. No one was able to lie down at length to take rest (The History of the British Convict Ship, "Success," n.d., p. 72).

The organization of space is described in detail for a convict ship sailing from Canada to Australia. One hundred and forty-four prisoners were placed on the lowest of three decks where they occupied a space of 75 feet in length and 4-1/2 feet in height (presumably, under 30 feet wide at the center). In this space prisoners ate, slept, and except when allowed on deck for brief spells, remained during the duration of their journey. In this particular ship, a partition was constructed along the center of the ship longitudinally, separating the French-Canadian prisoners from those of other national origin and forbidding communication between the two. The two passageways were each 11-1/2 feet in width and were further divided up into three feet of clear space, 18 inches of bench extending down the entire length of the passageway, and six feet of sleeping compartments. Each compartment was divided into an upper and lower berth, each berth holding four men.

The height between decks (5-1/2 feet or less) was so low as to provide little chance below decks for prisoners to relieve the effects of postural constraint imposed by their cramped berths. A first-hand observation of the landing of a prison ship in Australia stresses: ". . . great numbers were not able to walk, nor to move hand or foot;

such were slung over the ship side in the same manner as they would sling a cask, a box, or anything of that nature" (Johnson, 1954, Pt. I, pp. 30-31).

b. Ventilation. Ventilation was similar to that of the slave ships in the Middle Passage. Air and light were admitted through grated hatches. In some ships additional ventilation was supplied by means of air scuttles, canvas tubes conveying air below. In stormy weather it became necessary to keep the air scuttles closed and in heavy seas the hatches were battened down. Even in moderate weather, air scuttles frequently were unworkable because of the pitching of the ship (Bateson, 1959, p. 60). The oppressive atmosphere of the prison ship was often the subject of commentary in the literature. One such description is as follows:

> The stench of the ship, crowded with perspiring humanity, was indescribable and even to the prisoners inured to the fetid atmosphere of the insanitary gaols and hulks it must have been well nigh unbearable, particularly in the tropics. The acrid smell of the stale bilge water and of mouldy, rotting timber mingled in the still air with the foul odours of closely packed humanity . . . (Bateson, 1959, pp. 60-61).

c. Temperature. References allude to the suffering of prisoners crossing the tropics in a tropical calm. Such sources mention that:

> The air was stifling and oppressive. There was no draught through the barred hatches. The deck above them was blazing hot. . . . Day in and day out the terrible calm held the ship, and the consuming heat sapped the lives of the pent-up convicts (O'Reilly, Moondyne, in Bateson, 1959. p. 64).

In stormy weather, on the other hand, prisoners often found themselves engulfed in a swirling mass of water, leaving bunks and bedding soggy and damp. Many of the transports were known as "wet" ships; in these, prison quarters were always damp (Bateson, 1959, p. 60).

d. Food and Water. Prisoners' complaints about starvation and thirst receive frequent attention, although one convict's account of the food ration each received is contradictory:

> Breakfast, a pint of oatmeal, slightly sweetened; dinner, four ounces of salt beef, four ounces of suet pudding, and a few ounces of biscuit; or (on alternate days) a pint of pea soup, three ounces of bacon, and eleven ounces of biscuit; supper, a pint of cocoa, with whatever biscuit remained over from dinner (Prieur's Diary, in London, 1960, p. 167).

On this convict ship, food rations were brought down in one pail serving twelve men. One tin plate, a knife, a fork, and a spoon were provided. One source (Bateson, 1959, p. 6) holds that since every prisoner who died on the passage represented a saving on food expenditures, masters considered dead convicts to be more profitable than the living

Water rations varied from one to two pints per person per day. Water deprivation was felt most keenly during a tropical calm.

> There was only one word spoken or thought--one yearning idea in every mind--water, cool water to slake the parching thirst. Two pints of water a day were served out to each convict--a quart of half-putrid and bloodwarm liquid (O'Reilly, Moondyne, in Bateson, 1959, p. 61).

e. Sanitation and Disease. Ship prisoners suffered from contagious diseases, fevers, infestation and malnutrition. One source cites louse-infestation as a major menace despite a weekly washing of clothes and an occasional lime-white washing of living quarters.

> Lice, which were already in the beds and blankets issued to the prisoners, rapidly multiplied in such conditions as existed on the lowest deck. Soon they were on every occupant of the compartments, a torment by day and by night (Prieur's Diary, in London, 1960, p. 168).

Hygiene facilities for washing, excretion, etc. were reported as "limited" on the majority of convict ships (London, 1960, p. 167).

Some sources note that while a surgeon might be detailed on a convict ship, his powers and duties were left to the discretion of the Captain. Since work on a convict ship was neither lucrative nor pleasant, the calibre of the ship's surgeon was generally quite low (Bateson, 1959, p. 38, 40).

f. Work Demands. The nature of the work-activities of the prisoners aboard ship varied depending on the disposition of the Captain. Frequently, prisoners were kept in chains during the entire voyage and although the humane Captain occasionally had them removed for part of the voyage, throughout the entire duration of many voyages male convicts were ironed to ringbolts (Scott, 1940, p. 418). The "cat-o-nine tails" received occasional mention:

> The shipboard flogging at least in the first years of transportation, were often brutal and excessive, and scared masters, fearing for the safety of their ships, resorted to the lash often at the mere rumour of a mutiny attempt (Bateson, 1959, p. 63).

In some ships, prisoners were brought up on deck to exercise, the time and duration of this privilege being left to the Captain's discretion (Bateson, 1959, p. 86). The heavily chained prisoners presented a degrading sight to observers when exercising on deck:

> Ironed to one another by clanking chains, they shuffled dispiritedly round and round the deck to the jingle of their irons, with the scarlet-coated sentries closely watching them (Bateson, 1959, p. 62).

The voyage to Australia was long and tedious, and warders found it difficult to keep prisoners occupied. In the early days of convict resettlement little effort was made to keep prisoners constructively occupied except, perhaps, to have the men swab the decks. In later years, however, the men were made to pick oakrum and the women were supplied with sewing utensils. Eventually small libraries were stocked on ship and schools were formed permitting convicts to learn to read and write during the voyage (Bateson, 1959, pp. 63-64).

g. Social Interaction. Social disorganization aboard ship received great attention. Investigations arose from concern about "immoral behavior"--with allegations of a ship being like "a floating brothel." Indications of group interaction are of a generalized nature, namely that much quarreling and feuding took place among prisoners and between prisoners and crew members. Many examples of thieving among prisoners as well as mutiny attempts are noted in the literature (Bateson, 1959, p. 87).

h. Psychological and Social Traumata. Convicts had already been initiated into prison life and its confining and deprivational aspects before embarking on the ships. For those prisoners who were confined below deck during most of the voyage, there was visual impairment:

> From their long confinement in the dark cells the eyesight of the convicts was generally ruined (History of the British Convict Ship, "Success," n.d., p. 72).

4. Duration and Continuity

Deaths and morbidity were observed at the time to be correlated with length of voyage. There were three different sea routes to New South Wales, Australia, the principal point of debarkation; the shortest and most direct route involved the lowest mortality, as shown in Table 1.

Table 1

MORTALITY AND MORBIDITY FOR CONVICT TRANSPORTS FOR ROUTES OF VARYING DURATION

Average Length of Voyage	Number of Voyages	Number Transported	Total Number Died	Total Number Arrived Sick
126 days (By-passing Cape of Good Hope)	144	7,657	71	97
146 days (Touching at Cape of Good Hope)	11	1,912	9	57
156 days (Touching at Rio de Janeiro)	38	6 470	132	123

(New South Wales. Report of the Commission, 10 June, 1822, p. 10.)

Although convict ships were often detailed at ports, evidence indicates that prisoners rarely disembarked until they reached their final destination. Initial reactions to crowded living conditions aboard ship were seldom alluded to partly because convicts had been inured to conditions of crowding in land prisons. Few references are made to post-transport situations among the prisoners after arrival in Australia, except for isolated cases of temporary blindness or physical impairments. It can only be remarked that in this manner did Britain populate what became a vigorous nation.

5. Population Characteristics

In the early days of transportation men and women were sent on the same ship. Later, however, the sexes were segregated because of the prevalence of prostitution. Children of both crew members and prisoners often accompanied their parents on ship. Many young men and women were among the convicts transported; between 1812 and 1817 a total of 1116 convicts under 21 disembarked in Australia (Bateson, 1959, p. 65). Some large transports were also made of French Canadians. The prisoners embarking from England were largely Irish, many convicts being political prisoners (Scott, 1940, p. 421). According to authority:

> Batches of Irish "exiles" were transported for participation in the insurrection of 1798. . . . The Irish transportations were conducted so loosely that no papers were sent out to show for what periods prisoners had been sentenced; indeed, there were hundreds of cases in which no record had been kept in Ireland. They were tried by court martial, sentenced, put on board the transports, and conveyed overseas without the formality of an entry of their names and convictions (Scott, Vol. II, 1940, p. 421).

The numbers conveyed on a convict ship varied from 200 to 550 (Bateson, 1959, pp. 111, 153). The majority of them were in poor health before sailing to Australia. As one source expresses their condition:

> As many of the convicts had been in custody in the fever-ridden gaols of hulks for months, they were in a wretched state of health (Bateson, 1959, p. 55).

Bateson (1959) indicates that a medical examination took place before embarkation, but it was largely a "useless formality."

6. Impact

a. Individual/Physiological. Scurvy, dysentery, typhoid fever, smallpox and other diseases were commonplace among prisoners, as well as seasickness--a discomfort experienced by most prisoners (London, 1960, p. 167). Dysentery was rampant during the voyages, ". . . making the hold so foul that others were also afflicted" (London, 1960, p. 191). Infestation was mentioned earlier.

Diseases and prolonged immobility made many prisoners permanently unfit for work, although the proportions of those fit varied greatly for the various fleets that made the voyage (Johnson, 1945, Part I, pp. 31-33).

b. Psychological Impact. No particularly useful information regarding lasting effects of the voyage on the psychology of the victims has been found.

c. Mortality and Morbidity Rates. Information on mortality and morbidity has been presented above as related to duration of the voyage. Over-all statistics for deaths are available for vessels, fleets and periods of time. In the early stages of transportation, mortality rates are reported to have been high. Between 1787 and 1800, 43 convict ships sailed from England for Australia. They embarked with 7,486 prisoners--6,040 men and 1,441 women of whom 705 men and 51 women died on the trip, making a total of 756 deaths. Thus, one man died out of every 8.57 convicts embarked and one women out of every 28.2 female prisoners (Bateson, 1959, p. 153). One possible explanation for the death rate of female convicts being much lower than that of men is cited in the Commission's Report on New South Wales in 1822:

> In consequence of the freer admission to the deck that is allowed to the female convicts during the passage their health is rarely affected by the same causes that are prejudicial to that of the male convicts. . . (New South Wales, 1822, p. 10).

"Overcrowding" is also given as a reason for the high death rate. Governor Phillip of New South Wales was reported to have informed the British government that the high mortality rate had been caused ". . . by the contractors' having crowded too many on board [and] from their being too much confined during the passage."

"I believe," he added, "while the masters of transports think their own safety depends on admitting few convicts on deck at a time, and most of them with irons on, which prevent any kind of exercise, numbers must always perish on so long a voyage, and many of those now

received are in such a situation from old complaints, and so emaciated from what they have suffered on the voyage, that they will never be capable of any labour (Scott, 1940, Vol. II, p. 418).

Statistics on mortality are available for individual voyages and indicate that, in spite of the necessity of crowding, the mortality rate was frequently surprisingly low. According to one surgeon's report on the death rate for the First Fleet which sailed in 1787, out of 568 male and 191 female prisoners who actually sailed, 20 men and 3 women died on the passage. A surgeon detailed on the Lady Penrhyn, which recorded only 2 deaths, stated:

> It is pretty extraordinary how very healthy the convicts on board this ship in particular and the fleet in general have been during so long a passage and where there was a necessity of stowing them thick together. . . (Bateson, 1959, pp. 100-101).

The voyage of the First Fleet took between 250 and 252 days, of which 68 days were spent in ports.

In 1790, the Second Fleet, composed of three ships, sailed via the Cape of Good Hope, taking 160 days. The fleet experienced the highest rate of mortality of any of the convict transports. Statistics on mortality and morbidity for these ships are shown in Table 2.

Table 2

MORTALITY AND MORBIDITY FOR SHIPS OF THE SECOND FLEET

Ship	Number Transported	Total Number Died	Total Number Arrived Sick
Neptune	520	163	269
Scarborough	252	68	96
Surprise	211	42	121

(London, 1960, p. 191.)

An eyewitness account of the landing of the Second Fleet gives the following description of the conditions of prisoners upon landing:

> Was first on board the Surprise. Went down amongst the convicts, where I beheld a sight truly shocking to the feelings of humanity, a great number of them laying, some half and others nearly quite naked, without either bed or bedding, unable to turn or help themselves. Spoke to them as I passed along, but the smell was so offensive that I could scarcely bear it . . . The Neptune was still more wretched and intolerable, and therefore never attempted it. Some of these unhappy people died after the ships came into the harbour, before they could be taken on shore--part of these had been thrown into the harbour, and their dead bodies cast upon the shore, and were seen laying naked upon the rocks. . . . The landing of these people was truly affecting and shocking; great numbers were not able to walk, nor to move hand or foot; such were slung over the ship side in the same manner as they would sling a cask, a box, or anything of that nature. Upon their being brought up to the open air some fainted, some died upon deck, and others in the boat before they reached the shore. When come on shore, many were not able to walk, to stand, or to stir themselves in the least, hence some were led by others. Some creeped upon their hands and knees, and some were carried upon the backs of others. . . . The number landed sick were near five hundred, most at the hospital and some few dispersed here and there throughout the camp. The misery I see amongst them is inexpressible; many were not able to turn, or even to stir themselves, and in this situation were covered over almost with their own nastiness, their heads, bodies, clothes, blanket, all full of filth and lice. Scurvy was not the only nor the worst disease thet prevailed amongst them (one man I visited this morning, I think I may safely say, had 10,000 lice upon his body and bed); some were exercised with violent fevers, and others with a no less violent purging and flux (Johnson, 1945, part 1, pp. 31-33).

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APPENDIX E

CIVIL WAR PRISONERS

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CIVIL WAR PRISONERS

1. Background

From a review of prisoner-of-war internment experiences, the Civil War prisons were selected for intensive study. Although the original intent of both Confederate and Union officials was not to incarcerate captured prisoners of war, the system of prisoner exchange was terminated by General Grant on April 17, 1864. By the spring of 1864, Southern prisons were crowded with Federal prisoners at Andersonville, Florence, Macon, Columbia, Millen, and Richmond. Their Northern counterparts were soon to encounter similar high crowding of war prisoners. The total numbers confined were roughly 211,000 Union soldiers and 463,000 Confederates. Although the bulk of factual data compiled in the immediate post-Civil War period focuses on conditions in the Southern prisons, evidence exists on high mortality and morbidity rates for Northern POW camps as well.

2. Availability and Nature of Source Material

Accounts of Civil War prisons are considered to be of special value for the present study because of profuse and varied material they contain on extremely overcrowded conditions. Data on Civil War internment are readily accessible in the Library of Congress and include a broad range of autobiographical accounts, scholarly works and governmental investigations dating from both during and after

the event. Of particular value are the medical reports on causes of mortality in internment. Terms such as the phrase "crowd poisoning" coined by an Army physician indicate the special relevance to the present topic. Annotated bibliographies of the Civil War internment literature are available providing judgments of the reliability of sources as well as biases of authors. A small selection of 20 sources was covered in the initial survey and all were judged to be both highly relevant and relatively precise in the data they present on overcrowding. One source (Hesseltine, 1930) critically reviews the post-war testimony and suggests it exaggerated considerably the hardships endured by the prisoners.

3. Environmental Features

a. Space. Some of the Civil War camps were outdoor stockades; others were enclosures such as former warehouses and civil prisons. Common to all was an extreme degree of overcrowding. The following are examples of reported overcrowding in various camps:

(1) In the Libby prison there were more than 1,100 men confined at one time. Taking the measurement of the building at 100 x 105 feet on each of the two stories, it would give less than 25 square feet per man. In this crowded condition, they lived day after day with no beds no bunks, and nothing to sit on but the bare floor (Isham, Davidson, Furness, 1890, p. 451; U. S. Sanitary Commission, 1864, p. 31).

(2) At Florence 15,000 men were confined in 15 acres. This was curtailed by the ever-present accumulation of the dead, but allowing the full space, it gave only 4-1/4' x 10' per man (U. S. Congress, 1869, p. 226).

(3) Salisbury Prison contained five acres with 10,000 prisoners, or 20 square feet to the man (U. S. Congress, 1869, p. 226).

(4) The race-course, Charleston, South Carolina contained 40 acres, in which were confined 12,000 prisoners; this allowed an area of 132 square feet to the man (U. S. Congress, 1869, p. 226).

(5) In Pemberton, 300 men were confined in one room of 25' x 98'. They were forbidden to approach the windows on pain of death. This allowed eight square feet to each man (U. S. Congress, 1869, p. 226).

(6) At Smith prison 500 men were confined in a tobacco press room providing 2,400 square feet of space. Dividing space equally among those present would give each man less than five square feet in which to spread himself. Counting out the space occupied by the presses, there was not more than four square feet of room for each (Davidson, 1865, p. 47).

(7) At Belle Isle, a small island in the James River, the number of prisoners ranged from ten to twelve thousand men. So crowded were they that, at least according to the estimated area given them, there may have been but a space 2' x 7' or at the most 3' x 9' per man (U. S. Sanitary Commission, 1864, p. 31).

(8) Space allotment per prisoner at Andersonville varied from 98.7 square feet to 33.2 square feet. These measurements, however,

represented the prison encampment in a better light than it actually was since sections of the land were wholly uninhabitable (U. S. Congress, 1869, p. 96).

Within the mass camps, men got together on their own in groups of various sizes to improvise group shelters--"shebangs" designed from whatever scant material was at hand. In the "shebangs," as in the jails, accommodating to the physical presence of each other required deliberate measures.

> To such degree were we crowded, that we were obliged to arrange ourselves in tiers, like pins on paper, when we slept at night. . . . Constant interference of some one's feet with another's head or shins caused such continued wrangling as to make night and day more like an abode of fiends than one of human beings (Goss, 1867, pp. 26-27).

Schemes for sleeping included side sleeping, sleeping spoon-fashion and a tiered pattern. A commentary on conditions at Danville Prison emphasized the problem of sleep space:

> It is impossible to find a place to sleep without disturbing some one. In order to economize space, we have yielded to the necessity of SLEEPING SPOON-FASHION. At the best, large numbers are compelled to sit up till morning, and then take the places others have vacated.
>
> In spite of the annoyance there is something comical in our situation. We pack ourselves down to rest as a housewife would pack her silver spoons to lay them away; and when any one gets tired of lying on any given side, he sings out, "Spoon to the right"! or, "Spoon to the left"! as the case may be, and all turn in the direction indicated by the speaker.

> If a man has occasion to leave his place during the night, he is sure to find it filled when he returns; and he will not even know who is the trespasser, unless he has taken the precaution to count and number his place from the wall (Glazier, 1868, p. 104).

b. Temperature and Ventilation. The largest part of the literature deals with camps in the southeastern United States. Particularly central Georgia, South Carolina, and Virginia. These are all areas of severe summer heat, moderately harsh winters, and almost constantly high humidity. Consequently, suffering from heat and cold come second to food in prisoners' accounts of their distress. In the enclosed prisons, such as that at Belle Isle a former warehouse, and at Richmond, Virginia, poor ventilation aggravated the effects of temperature:

> The only ventilation was by means of the walls, the windows not being allowed to be raised, except as they were occasionally slipped up an inch or two, when the guard was not particularly attentive (Davidson, 1865, p. 48).

Crowding reached such extremes that inadequate ventilation became an acute problem in the large, open stockades, such as Andersonville and Florence. The high log palisades surrounding these camps blocked gentler winds and thus much of the time prevented the removal of what contemporary sources called the "noxious gases" and the "crowd poisons" that collected in the air of the camps. Prisoners suffered from heat in both the open stockades and the enclosed areas. Similarly:

> The hot sun developed all its pestiferous poisons, and the foul effluvia which arose hence was terrible (Sabre, 1866, pp. 91-92).

c. Food and Water. There is much emphasis on individual reactions to lack of food and a balanced diet, monotony and inadequate drinking water. At Andersonville the diet consisted of "rusty" bacon and "course, maggot-filled" bread (McElroy, 1962, p. 311). Food was distributed at Andersonville daily on a per-thousand-prisoner-basis; the amount allotted per thousand varied from ten sacks of food down to four sacks or less than a half pint each (McElroy, 1962, p. 311). Prisoners constantly daydreamed about food.

> The ravages of vermin, filth and hunger soon began to appear, and, as if to tantalize us still more, our thoughts could run upon nothing but food. The strength of a hungry man's imagination is wonderful. The finest dishes which a French cook, par excellence, could invent, were garbage compared with the fancy cuisine of those famished men. We had beef roast and steak, for substantials, oysters, lobster, &c., for side dishes, and the pastry which we conjured up, was beyond all comprehension, wonderful. After all had retired to our floor board for the night, the hours, till midnight, were spent in contemplation of the luxuries we would have had for supper, if we had been at home, and many and hot were the discussions we held over these imaginary repasts (Davidson 1865, p. 53).

d. Sanitation and Disease. There are frequent references in the Civil War data to the correlation between disease spread and the dense packing of the interned population. Inference is made that high mortality and morbidity rates can be traced directly to extreme overcrowding in the Civil War stockades. According to one medical source:

> From the sameness of the food, and from the action of the poisonous gases in the densely crowded and filthy stockade and hospital, the blood was altered in its constitution, even before the manifestation of actual disease (Surgeon Jones, in Isham, 1890, pp. 455-456).

Despite the filtering of observations through the archaic theories of disease supported by both physicians and lay observers in the Civil War period, a great deal of medical information is available and apparently of otherwise unbiassed accuracy.

Several sources indicate the lack of facilities for washing and for sanitation. Open stockades such as at Andersonville and Florence, were usually situated around a small creek that served as a sewer, latrine, lavatory, and water supply. Prisoners attempted to use this facility in the reverse order for each purpose along the course of the stream. Crowded conditions and lack of enforcement interfered with the limiting of pollution occurring downstream.

A prisoner was often forced to cook, eat, sleep, and wash in an area cited by one source to be 10' x 2', in another source, 2' x 7'. Vermin are alluded to as a constant concern of prisoners. Medical care for prisoners was often unavailable and usually, when available, of very poor quality.

e. Work Demands. Sources report both individual and group work programs for the benefit of the captor force, as well as details such as wood-gathering and burial. One source (Nott, 1865, p. 95) lauds the value of self-imposed work or activity indicating that once one succumbed to the impulse to do nothing, despair ensued. Generally, however, internees were left alone to manage for themselves. The monotone life of a prisoner confined in limited space was felt by some to be the worst type of deprivation.

> One of the worst enemies we had to contend with was idleness. This monotony at length became more horrible than our imprisonment, and it often seemed that death would be a welcome change; so utterly exhausted were we with this prostrating ennui (Davidson, 1865, pp. 91-92).

f. Social Interaction. There are references in the literature to violent clashes both between captor officials and prisoners and among the internees themselves. The prison commandants were frequently in conflict with the internees as well as with their own officers. Sources also point to violence among the internees, both organized and impulsive. Disputes, such as the celebrated clash of "Raiders" and "Regulators" at Andersonville arose over the stealing of clothing, scrambling for food, taking blankets and money (McElroy, 1962, p. 102ff).

There was little mail exchange, and only occasional visits by relatives of the prisoners who resided in the enemy area. Several sources cite the prevalence of rumors and the rapid circulation of them throughout the camp. Prisoner groups seem to have been able to make fair inferences about the status of the war from contact with recently-captured men and from overhearing conversations of their captors.

Active proselytizing took place on both sides. About 8,500 prisoners enlisted in the Army of their captor (Hesseltine, 1930).

g. Psychological and Social Traumata. There are excellent references in the literature to traumatic impacts of confinement. Pictures are vividly drawn of conditions of degradation, the effects of being uprooted from former contacts, and reactions to family separation.

Among Union prisoners, there appeared to be fairly uniform confidence in an eventual Union victory. This did not preclude reactions of anguished despair, however. Since many doubted that they would be able to hold out until the day of liberation.

4. Duration and Continuity

Periods of captivity ranged from a few months to five years. Autobiographical accounts emphasize the personal impact on the captive of uncertainty of his time of release. Like other POW experiences, this element of suspense was considered to be the most disconcerting fact of internment. Parole and exchange, as well as proselytizing were practiced by both sides.

5. Population Characteristics

The sizes of the groups confined at various times and places is readily identifiable in the literature. No references to female prisoners or mixed groups were located. Sources indicate internment camp populations ranged from 500 to 40,000 men. The total number captured by both sides was about 674,000. There was a liberal representation of recent immigrants, foreign volunteers and Negroes among the Confederate-held prisoners.

6. Impact

a. Individual/Physiological. The literature contains numerous references to the prevalence of chronic and contagious diseases among internees. Medical reports submitted by Army technicians indicate the

existence of a high incidence of G-I disorders. One such report issued the following statement:

> The bowel affections appear to have been due to the diet, the habits of the patients the depressed, dejected state of the nervous system and moral and intellectual powers, and to effluvia arising from the decomposing animal and vegetable filth (Isham, 1890, p. 456).

Contagious diseases, skin disorders, and infections are touched on. Gangrene appeared frequently among internees. A general syndrome of multiple disease symptoms, debilitation and psychological withdrawal was common.

b. Individual/Psychological. Individual accounts of experiences in Civil War camps relate descriptively the psychological effects of confinement. Factors such as contending with monotony and uncertainty of the imprisonment period have been mentioned earlier. Data on adaptability to prison life reveal wide ranges of individual reactions to confinement. Protective withdrawals are most frequently mentioned:

> There is a kind of armor of indifference which yields to circumstances, but cannot be penetrated by them. As soon as one gives way to melancholy despondency, as thousands naturally do under such circumstances, the lease of such a man's life in prison is not worth purchasing.
>
> There was a phase of character developed by prison life which was neither joyous nor sad in its outward expression, seemingly a quiet bracing of every nerve, and the concentration of all the powers of mind and body against disease and death, in which men neither laughed, nor smiled, nor cried, nor could anything move them from their impervious calmness of demeanor (Goss, 1867, pp. 93, 242).

> Anxiety, as well as a deadening of sensibilities, was experienced by some of the prisoners, one of whom relates: "Scarcely an hour [passed] in which anxiety about distant friends, suspense in regard to the future, and frequent despair, were not felt" (Abbott, 1865, p. 95).

c. Groups. Information is also plentiful on group behavior and dynamics in the camps and prisons. Illustrative topics discussed are campfires, events that affected general morale of the group, different personality and social types in spontaneous grouping, as well as leadership and organization.

Prisoners originally grouped together to build "shebangs" for mutual aid and protection on the basis of the pre-existing close friendships and identifications formed in combat units. These groupings were volatile, however. One can use the analogue of the closely packed molecules of a mixture of gases under increasing pressure to describe what happened to most of these groups. Friction, heat, and differential affinities were frequently attaching and detaching individual members and clusters of the small groups in the camp. Groups also continually suffered from attrition as the ever high death rate precipitated vulnerable individuals out of the system. Over time, relatively stable small groups, and constellations of them into gangs, emerged. The approaches to equilibria were possible because the many sources of intragroup friction and the very low thresholds of the prisoners for insult and injury were balanced by mounting apathy and lassitude, the lack of energy to quarrel, and the mutual dependence of small group members amidst the predatory milieu of the larger society.

Affinities acting to attract members from one group to another included: the desire for a larger group of sleeping mates for the extra warmth available from body heat; the need to attract a good fighter into quarrels with fellow prisoners; the desire to add newly arrived friend or relative to one's own group; and the necessity of acquiring blanket, canvass, or wood in another's possession with which decaying "shebangs" could be mended.

d. Mortality Rate. Statistics on death rates are contained in governmental reports and various scholarly studies of the Civil War camps. Sources state that over-all deaths for various camps ranged from 10 to 25 per cent of those ever interned in them. Statistical information is detailed on death rates for the individual camps on a monthly as well as yearly basis. Daily rates are sometimes given. One conservative estimate of the mortality rate is:

> 211,211 Union soldiers were captured; of these 16,668 were paroled and 30,218 or 15.5 per cent, died in captivity; while 462,634 Confederates were captured, of which 247,769 were paroled and 25,976, or 12 per cent, died in prison (McElroy, 1962, p. VIII).

e. Morbidity Rates. The incidence of various types of disease is available for specific periods and camps. In Andersonville the following diseases were recorded during a six months period, starting March 1864:

	Disease	Cases	Deaths
(1)	Acute diarrhea	9,775	2,161
(2)	Scurvy	9,501	999
(3)	Acute dysentery	3,549	840
(4)	Chronic diarrhea	2,315	1,369
(5)	Pneumonia	528	234
(6)	Remittent Fever	468	28

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APPENDIX F

ADDITIONAL HIGH CROWDING CATEGORIES RESEARCHED

APPENDIX F

ADDITIONAL HIGH CROWDING CATEGORIES RESEARCHED

The following additional categories of high crowding were investigated:

1. Crowded Slum Housing
2. Troop Transport
3. Civil Prisons
4. Sieges
5. Coolie Trade
6. Natural Disaster
7. Shipwrecks
8. Israeli Migrations
9. Civil Defense Sheltering: British Shelters in World War II
10. Displaced Persons Camps
11. Wartime Urban Evacuation
12. Mental Hospitals
13. Isolated Experimentals on Confinement and Related Variables
14. Melina

In each of the above categories, some incidents were found providing information that pertained to a limited number of relevant variables. The kinds of data found in each of these categories is summarized below, with bibliographical information included at the end of the appendix.

1. Crowded Slum Housing

Urban slums have been the subject of study for hundreds of years in connection with the dangers to health and morality arising from chronic conditions of overcrowding. A celebrated letter from Erasmus to the English king detailed effects of the densely crowded slums of British towns and made urgent recommendations for improving ventilation and sanitation.

There are hosts of statistical investigations showing extremely high association of many diseases with various indexes of overcrowding. Only in a few instances, however, do these studies attempt to control the effects of other aspects of poverty.

For the present purpose, this literature does not advance us much beyond a general statement that crowded housing is demonstrably unhealthy, physically, psychologically, and socially. To use a 19th Century expression of this generalization:

> The overcrowding lowers the general standard, that the people get depressed and weary, is the testimony of those who are daily witnesses of the lives of the poor. The general deterioration in the health of the people is a worse feature of overcrowding even than the encouragement by it of infectious disease. It has the effect of reducing their stamina and thus producing consumption and diseases arising from general debility of the system whereby life is shortened. Nothing stronger could be said in describing the effect of overcrowding than that it is even more destructive to general health than conducive to the spread of epidemic and contagious diseases. Unquestionably a large amount of infection which ravages great cities is due to the close packing of the population (Great Britain, House of Commons, 1884-1885, p. 25).

Various definitions of overcrowding figured in investigations and attempts at regulating slums. Numbers of persons per room was a frequent standard--more than two or more than three persons per room being called "overcrowded."

One method used in health regulations as early as the late 19th Century was the setting of minimum densities of air per person, as well as permissible numbers of occupants in a given area. The required amount of cubic feet of air to each adult living in a New York tenement in 1889 was fixed at 600 cubic feet. In Great Britain the Poor Law Board in the late 19th Century set the following minimums, although they were not enforceable:

> The Poor Law Board says that there ought to be a space of 300 cubic feet for a person in health; that for a woman lying-in it should be 1,200 cubic feet; for the infirm who use the same room night and day 700 cubic feet; and for the infirm who use one room by night and a separate room by day 500 cubic feet (Great Britain, House of Commons, 1884-1885, p. 245).

Although public health officials proceeded on the basis of establishing minimum standards in terms of cubic densities, health officials believed that the problem of ventilation was not associated with the amount of cubic feet of air. "What one wants is 'unused air.'" (Great Britain, House of Commons, 1884-1885, p. 77.) "Unused air" meant air that had not been breathed over and over by the same individuals or by other people. They pointed to various critical differences, both structural and in the nature of human activities that had to be considered.

Other types of information prevalent in the literature on slums concern the lack of privacy, immorality, morbidity, and defective ventilation. Statistical data provided by the U. S. Census of Housing covers such items as population per unit, persons per room, numbers of rooms per dwelling, "dilapidation," and sanitary facilities.

CROWDED SLUM HOUSING

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2. Troop Transport

Space allotments per person aboard a troop ship are detailed in the manuals of British and American sea transport services. One account describes life on an American troop transport of World War II carrying a total of 1500 men. The space allotted to each man was an area six feet long, three feet wide, and two feet high. A communal room, 50 feet square, provided the only extra room for recreation and relaxation (Holliday, 1952, pp. 30-31).

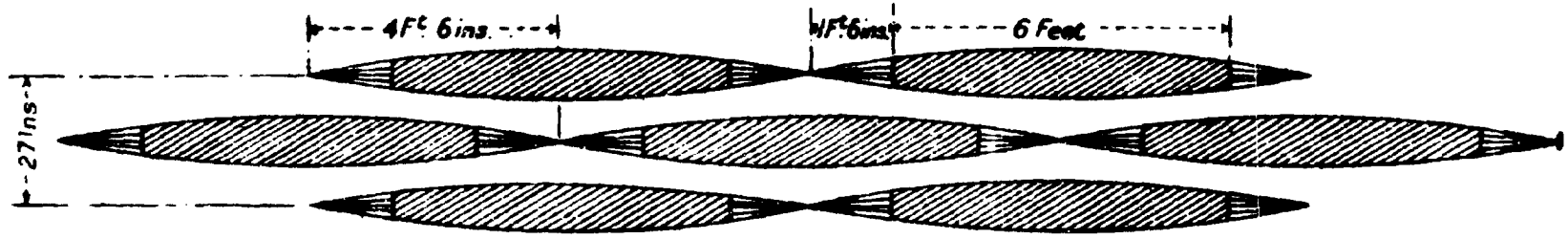
In a British transport of World War II, sleeping space determined the number of troops to be stowed aboard ship. The total number of troops to be shipped amounted to the actual number of hammock billets plus 25 per cent. In times of emergency, the number of troops to be carried equalled the number that could be seated at mess tables spaced 5 feet 6 inches apart, center to center, even though that many hammock billets could not be fitted. Sketches I, IV, and V illustrating the spacing of hammocks have been taken from the manual published by the Great Britain Admiralty (Regulations for His Majesty's Sea Transport Service, 1942).

Chell describes how the maximum space-utilization was achieved on a British transport of World War II:

> Mess decks cannot but vary greatly in capacity: one may take 480, another 130. The great thing in berthing is to have only one deck of mixed units--the various "overs." As one descends the companionway to a mess deck one sees painted on the bulkhead a legend like this:
>
> C/4 Mess Deck
>
> | | |
> |---|---|
> | Hammocks | 189 |
> | Messing | 240 |
>
> You ask where the 51 slept? They were our "hard-liers"; two on each mess table, some on the emptied hammock racks, the remainder on the deck(floor) (Chell, 1948, pp. 9-10).

Regulations governing ventilation aboard troop transports in the present century provide points of comparison with recommended standards for shelters. As an example of such regulations, an American troop transport in 1919 required that "ventilation supply to crew and troops' berthing

PLAN FOR BERTHING HAMMOCKS IN TRANSPORTS AND FREIGHT SHIPS FOR TROOPS.

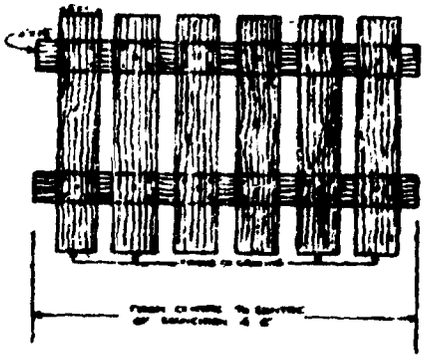


Sketch I.

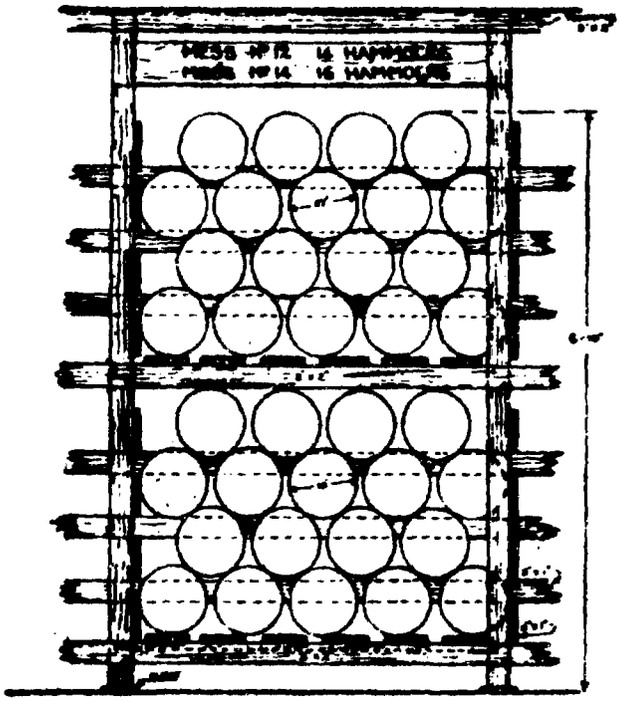
F.S.D.5

SKETCH SHEWING ARRANGEMENT OF HAMMOCK RACKS IN DOUBLE TIER

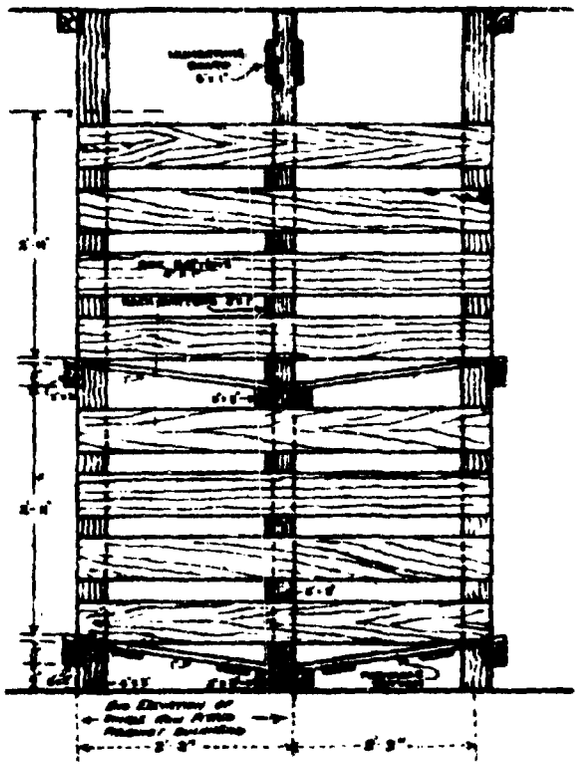
PLAN OF PORTABLE BOTTOM FOR LOWER BIN



FRONT ELEVATION



END ELEVATION

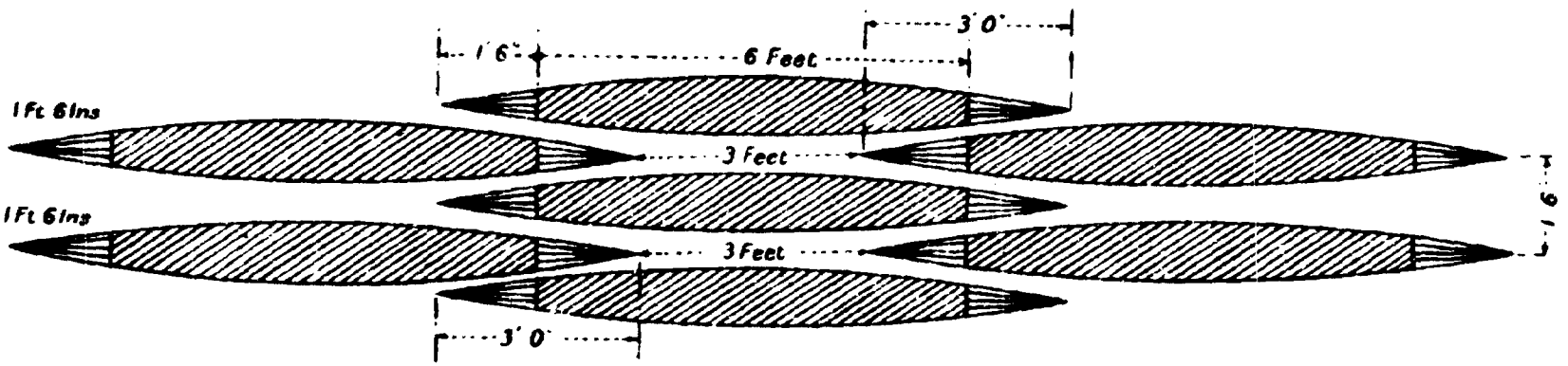


Sea Transport Department
Board of Trade

F-8

Sketch IV.

PLAN FOR BERTHING HAMMOCKS IN TRANSPORTS AND FREIGHT SHIPS FOR MEN OF THE ROYAL NAVY



Sketch V.

spaces will be on the basis of a minimum of 16 cubic feet per minute per man, air to be changed in intervals not exceeding 10 minutes,. . ." (General Specifications for Fitting Out Troop Transport, 1919, p. 27). The inflow of air for other sections of the ship were designated as follows:

> Sick bay, 8 minutes
> Galleys, 2 minutes
> Operating room, 2 minutes
> Toilets, 4 minutes
> Wash rooms, 10 minutes
> Toilets and wash rooms, when combined, 7 minutes
> (General Specifications for Fitting Out Troop Transport, 1919, p. 27).

Rules concerning ventilation on a British troop transport of World War II were less precise. The supply of fresh air was to be direct and separate from the system of exhaust. Air scuttles and shafts were to be utilized supplemented by a blower fan capable of supplying at least 2,000 cubic feet of air per minute. The regulations were predicated on the unreliability of both the mechanical blowers and scuttles. No cfm/space minima were prescribed.

On a densely packed American troop transport of World War II, systems of ventilation were unable to prevent high temperatures in the troop quarters especially when passing through the tropics. The heat and its effect were reported as follows:

> The first thing you noticed about the troop area was the heat, heat which the ship's company could do nothing about. For, with over a thousand men packed to the topmost pipes and with their equipment hung from every inch of available space, no blowers in the world could keep it cool. And so the temperature rose and rose, until the troops stopped asking

about it, stopped even talking about it. They merely sweated like animals. Perspiration poured off them in streams, soaked their clothing, dripped from their foreheads and the ends of their noses endlessly. The showers were turned on only certain hours a day. Not all of the men could make them. So they sat in their fatigues and steamed. They stripped to their T shirts and kept steaming (Holliday, 1952, p. 32).

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4. Sieges

Interesting data is available from diaries, memoirs, letters and historical accounts of the siege of the Peking legations, the Leningrad siege of 1942 and the siege of Delhi during the Indian mutiny of 1856 on the personal reactions to living under siege conditions.

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5. Coolie Trade

The term, Coolie, applies to Chinese and Indian indentured laborers who were transported overseas during the 19th Century. Four sources

devoted to the topic of the coolie and to conditions of transport were located, one giving background information only and another being an autobiographical account of personal experiences as a coolie. These sources provide factual data as to the contract system, its origin, transport facilities, terms of the contract and final destinations. The system of contracting overseas laborers became popular in the Mid-19th Century shortly after the abolition of slavery in the British overseas empire in 1833. Indian and Chinese laborers were sent to Mauritius, the West Indies, Chincha Island, Hawaii, Brazil, and Central America; approximately 340,000 Indian coolies were shipped to foreign ports during the years 1847-1870 (Williams, 1879, p. 10).

Conditions aboard a coolie ship were similar to those that existed during the Middle Passage of the slave trade. For example, a description of a Chinese coolie ship is given as follows:

> Such members were stowed into the vessels and such poor food given to them that, notwithstanding their [illegible]dy manner of life at home, hundreds died on the [illegible]ge (Conwell, 1871, p. 87).

However, the limited number of sources that were located on the coolie trade precluded a more comprehensive treatment of the topic. A research assistant working on the study checked the availability of material on the subject in British Guiana while on a personal trip there. More detailed accounts than were found at the Library of Congress are available in the Georgetown, British Guiana Public Library as well as in the archives of one of the major newspapers there, The Chronicle.

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6. Natural Disasters

The extensive research on natural disasters that has been carried out, particularly since World War II, was reviewed for information relevant to the present topic. All abstract cards on file with the Disaster Research Group, National Academy of Sciences--National Research Council were reviewed. Note was also taken of works published during the course of the present project.

The most directly relevant material in this literature is that regarding evacuees from extensively devastated areas. This material is useful for its descriptions of problems arising among persons unaccustomed to living closely with one another, whether kin or unrelated persons. Information on this question was found both in descriptions of temporary mass shelters and in longer term billeting of homeless people in host households. The major sources dealing with evacuees from floods--particularly the studies of the Holland, British and Louisiana floods of recent years. Klausner's study of relations between evacuees from a tornado-stricken community and their hosts is also relevant.

These studies deal with such problems of adjustment as: differences in social background characteristics between evacuees and hosts; fluctuations in tensions with degrees of crowding and with time; differences in adjustment in circumstances of voluntary and compulsory billeting and between formally and informally arranged places to stay. Of some interest with respect to overcrowding is Klausner's finding that tension between hosts and guests was lower in both the least and most crowded households and higher in the moderately crowded ones.

The conditions of overcrowding that existed in these situations were far too moderate to have direct bearing on the questions of survival posed for the present project. For the purposes of the present study, the disaster research literature that deals with events during and immediately after the impact of the catastrophic condition is probably more valuable for its indirect pertinence. While the observations and findings of such research rarely relate directly to circumstances of overcrowding, they provide knowledge of behavior under conditions of fear, flight, and disorganization--all essential to the evaluation of less intensively studied episodes of severe overcrowding on which we have relied.

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7. Shipwrecks

Although data on shipwrecks is abundant, few sources allude to the problem of overcrowding. Two exceptional sources covering the whole

subject are the British studies on Ship-Wreck Survivors: A Medical Study, 1943, and The Hazards to Men in Ships Lost at Sea, 1940-44, 1956. The former gives an account of a lifeboat voyage of 23 days describing the problem of space allocation.

> One of the greatest discomforts was the overcrowding; they arranged that one man only should lie down in turn for a measured hour. Only very brief snatches of sleep were possible. . . . All became covered from head to foot with sores, which aggravated their distress as they jostled or leaned against each other (Critchley, 1943, p. 48).

In this shipwreck incident 82 survivors (18 European and 64 natives of Indian origin) were cast afloat.

> Of the 18 Europeans, 5 died, while from the 64 natives there were 39 deaths. In the former group, exhaustion from anhydraemia and heat prostration seems to have been responsible, while salt-water poisoning was probably the cause of death among the natives (Critchley, 1943, p. 48).

Crowding appears to be interrelated with other deprivational factors:

> . . . there develop in time the characteristic mental concomitants of inanition, loss of sleep, dehydration, cold (or tropical heat), and physical pain--of wounds, soreness, overcrowding, and cramped immobility (Critchley, 1943, p. 69).

The data available from the records of many differently equipped and loaded lifeboats and rafts permitted isolation of the significance of various factors affecting survival, such as temperature, time adrift and water supply (McCance, Ungley, Crosfil, Widdowson, 1956).

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8. Israeli Migrations

Data on Israeli migrations reveals that refugee ships were loaded to an extreme capacity. The refugee ship, Exodus 1947, headed for Haifa with a total of 4554 passengers. Of these 1600 were men, 1282 were women, 1017 were young persons, and 655 were children (Gruber, 1948, p. 17). Similarly, on a ship called the Fede of 650 tons the passenger load was 1014. On the ten-day trip, water was restricted to half a pint a day. Food consisted of cold items such as hardtack, sausage, cheese, canned meat and vegetables, a little canned milk and dried pears. Medicines were limited to aspirin and morphine; 70 pregnant women were on board, two in their eighth month. Sleeping accommodations were available for only 500 persons, the remainder having to sleep on deck. The beds lining the hold were tiers of canvas strips less than a yard wide, each two feet above the other. Because of blockade conditions orders were given to everyone to remain below deck through daylight hours. Heat stroke and sea sickness were prevalent (Neikind, 1946, pp. 1-6, 11).

ISRAELI MIGRATION

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9. Civil Defense Sheltering: British Shelters in World War II

Overcrowding was a constant problem in the mass night shelters in Great Britain. In the attempt to establish standards regarding maximum occupancy and area density, British officials realized that it would be impossible to enforce such regulations, since admission to a public shelter could not be denied to anyone.

> The seating capacity of public shelters provided for occasional use, had been assessed at six square feet per person, or three and one-half square feet if artificial ventilation provided an adequate turnover of air. . . and yet so dense was the crowding in some shelters that even this space was not available (Guskin, 1960, p. 84).

Although the cubic density of air was set at 50 cubic feet per person in the early days of the London blitz in public shelters, a source cites an example of 30 cubic feet per person.

> 200 persons were found to be sleeping on the floor of the basement of Neckerbocker Buildings, Bermondsey, with less than 4 sq. ft. of floor space and 30 cubic ft. of air each. There was no ventilation, and at 2 a.m. some inspecting officers were attacked with hypernoea. The shelterers, however, slept on, and came to no apparent harm (MacNalty, 1953, p. 194).

In spite of the danger of disease resulting from crowded sleeping conditions, nothing reaching epidemic proportions did occur as a result of close contact created by population density in public shelters with the exception of minor respiratory infections and a high incidence of scabies (Fitz Gibbon, 1957).

Not only did the authorities observe a surprising absence of epidemic conditions, but found the general death rate from nonviolent causes

had fallen from the 1939-1940 level by 11 per cent during the 1940-1941 period. This was at a time when large proportions of the population were sleeping in rest centres or shelters. Probably an important explanation is the scrutiny by shelter and rest centre medical officers of the health of the lower classes--a segment of the society that during peacetime seldom enjoyed the benefits of such regular and careful medical care. Medical officers, having studied with relative precision the problems of the spread of disease in 13 shelters concluded:

> The shelter populations were first assembled at the end of a fine summer, they tended to come from the same locality and the same social group, and so to be concentrations of pre-existing groups. There was no large-scale massing of strangers, the population was relatively immobilized, and haphazard massing in places of amusement was lessened. The mortality figures for the country as a whole were low. The weather, though cold, was dry and unusually free from fog. The shelter population, in short, was tough and resistent, and the nation's diet carefully planned with adequate rations of protective foods. Morale was high, and unexpected patience, good temper and even heroism prevailed (MacNalty, 1953, p. 213).

The problem of lice was handled by establishing a special shelter equipped with baths and bunks; lousy clothes were sent on to a decontaminating plant. British health officials passed lice on to the laboratories of the School of Hygiene and Tropical Medicine to assist research against louse-carried diseases (Fitz Gibbon, 1957, p. 164). Among minor health problems was a plague of mosquitos which haunted the tubes in the winter attracted to the warmth engendered by the closely packed population. Lice as a health hazard apparently never became a crucial problem for several reasons:

> Firstly, the bombing was never so devastating as to disrupt all civilized amenities, and most people were able to get their underclothes washed and attend to personal cleanliness. Secondly, health propaganda made the shelterers aware of the risk and the shelter wardens were ready to deal with obviously verminous individuals (MacNalty, 1953, p. 203).

In the early days of shelter sleeping, health authorities noticed a rise in hypostatic oedema of the legs (a widespread use of deck chairs in shelters was felt to be contributory), but bunking ended this tendency (MacNalty, 1953, p. 194).

The noise of the raids frequently meant sleep was close to impossible. The resulting lack of sleep appeared to have little serious effect and it was frequently reported that the sounds of the largest noisemakers, the British guns defending their city, served as a source of reassurance.

> In an attempt to enable the people to sleep, the Government issued free earplugs, via the Wardens' Service, but despite much publicity--including a photograph which purported to show Winston Churchill asleep with earplugs plugged in--these never caught on. The almost universal explanation as to why they were not used was: 'I like to hear what's happening.' When it is realized that during the Blitz fear was intimately connected with noise, this makes sense. To block out the real noise was to open the way to all the fears of which the imagination is capable (Fitz Gibbon, 1957, pp. 120-121).

An attempt to solve the problems of providing shelter for the thousands made homeless by the bombing was made in setting up "rest centres." Although the authorities saw them as a short term (one or two weeks) refuge for those seeking homes with relatives or making efforts to repair the damage done to their own homes, there were many who continued

to use the centres for the duration of the war. They were generally located in schools, where tightly-packed occupants were served bread, margarine, potted meat, corned beef, jam, biscuits and tea. Washing facilities were totally inadequate; except for a few blankets, no bedding equipment was available. In one centre, not an atypical one, ten buckets and coal skuttles served as lavatories for two or three hundred people.

Whether social discord or harmony prevailed seemed dependent on the type of leadership that commanded authority. There were the leaders officially designated to take charge, and there were those who had emerged out of the people themselves in a spontaneous structuring of the situation. The case of "Mrs. B. the beetroot seller," who took highly efficient charge of a large centre, is often cited to illustrate the potential for leadership in unsuspected quarters (Titmus, 1950, pp. 262-263):

> Next to the shortages of food, blankets and equipment, insufficient staff was the biggest problem of the rest centres in the early days. It was here that many social workers voluntarily gave to the centres the benefit of their training. They had experience in handling distressed people, they knew the value of order, they were familiar with the detail of social provision. Unlike some--not all--of the poor law officials they were capable of taking the initiative, and of temporarily disregarding rules and regulations.
>
> . . . In other instances ordinary people of the neighbourhood quite naturally became leaders in the centres, just as they did in the shelters and the tubes.

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10. Displaced Persons Camps

Although the chief complaint in the displaced persons camps in post-World War II Europe was the delay over resettlement rather than the conditions of camp life, references describe such problems as overcrowding, lack of privacy, and tensions (Kee, 1961).

DISPLACED PERSONS CAMPS

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II. Wartime Urban Evacuation

Data relating to high crowding during evacuation of populations from cities for safety from air attack concur on the difficulty of establishing minimum standards regarding housing densities in emergency situations: ". . . densities will have to depend on the extent of evacuation necessary" (Ikle and Kincaid, 1956, p. 31). Although British experiences in World War II indicate that ". . . there was a 'degree of saturation' beyond which no more evacuees should be located in a given area," no exact specifications on what constituted "a saturation point" could be laid down. (Ikle and Kincaid, 1956, p. 31.) Indirect indicators of a possible saturation point appear to be the breakdown of sewerage systems and overcrowded sanitary facilities occurring in British rest centres established during World War II (Ikle and Kincaid, 1956, p. 32).

WARTIME URBAN EVACUATION

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12. Mental Hospitals

Sources on overcrowding in psychiatric hospitals is largely descriptive of 19th Century and early 20th Century public asylums. Overcrowding is discussed from the viewpoint of its effects on patient care, impairment of health of inmates, sleeping conditions, hygienic facilities and disease spread. A typical description of overcrowding and inadequate sanitary facilities by a British Board of Commissioners meeting in 1936 is as follows:

> Ward M_2 has only seven lavatory basins, five indoor W.C.'s and a urinal for ninety-nine patients. Ward F_2 has six basins and three W.C.'s for seventy-six women, and there is no staff W.C. Ward F_7 has three basins and three W.C.'s for fifty-five women and the basins are in a very narrow and unsuitable situation. . . At Job's Well House there has been no water supply in the W.C.'s for months and all water has to be carried to flush the pans. Only loose basins exist in the dormitories and all water has to be carried (Winterton, 1938, p. 86).

From a health standpoint, material on overcrowding in mental hospitals verifies the findings of other high crowding episodes--namely, that overcrowding often exacerbates the spread of infectious disease, dysentery, typhoid and respiratory ailments.

MENTAL HOSPITALS

REFERENCES

House of Commons. Subject of evidence arranged by J.B. Sharpe, Member of the Royal College of Surgeons. Report together with the minutes of evidence and an appendix of papers from the committee appointed to consider of provision being made for the better regulation of madhouses in England. London: Reprinted for Baldwin Craddock and Joy, 1815.

"Mental Patients in Jail--a National Disgrace." Parade Magazine Section, November 11, 1962.

Tuke, D. H. Chapters in the History of the Insane in the British Isles. London: Kegan Paul, Trench & Co., 1882.

Winterton, P. Mending Minds, the Truth about our Mental Hospitals. London: Peter Davies Limited, 1938.

13. Isolated Experimentals on Confinement and Related Variables

Illustrative of isolated episodes of acute overcrowding are the Black Hole of Calcutta; suffocation aboard the steamer, Londonderry; and heat prostration in a Kosti prison.

Basic to both the Black Hole and Londonderry disasters was severe overcrowding in a confined space. Although historical renditions of the Black Hole incident are not in agreement on the actual conditions of internment, several cite the description given in a survivor's diary (that of Holwell):

> One hundred and forty-six English were confined in the punishment cell of the fort, a room about eighteen feet long by fourteen wide with only one small window; twenty-three of them came out alive next morning (Woodruff, 1953, p. 96).

Suffocation of passengers aboard the Londonderry during a storm at sea in 1848 was caused by the crowding of 150 persons in an air-tight compartment, 18 feet in length, 10 feet in width, and 7 feet in height.

The deaths of 194 persons out of a total of 281 prisoners locked overnight in a Kosti jail with windows tightly shut (19 metres long by 5.5 metres wide by 3.8 metres high) was attributed to the fatal effects of heat rather than to the lack of air. Temperatures rose to a maximum of 103.8° F, humidity registered at 60% for that night (Haseeb and Amin, 1958, pp. 280-281).

ISOLATED EXPERIMENTALS ON CONFINEMENT AND RELATED VARIABLES

REFERENCES

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Lindsay, P. Sledge. London: Longmans, 1935.

Seaton, R. W. Hunger in Groups: An Arctic Experiment. Chicago, Ill.: Quartermaster Food and Container Institute for the Armed Forces, Quartermaster Research and Engineering Command, U.S. Army, 1962.

Woodruff, P. The Men Who Ruled India (I) The Founders. London: Jonathan Cape, 1954.

14. Melina

German annihilation measures directed against the Jews during World War II produced a phenomenon in various threatened ghettoes with some features resembling those of sheltering. These were melina--

underground hiding places in which inhabitants attempted to avoid detection by Nazi formations when the Jews were being seized for shipment to places of execution. One well-described melina is shown in Figure 2. This was constructed by members of the underground of the Kovno, Lithuania ghetto. It was 10 meters deep and about 100 meters long. For camouflage (and ease of construction) ventilation was provided by passing a pipe into the chimney of a building under which the chimney was extended. Although only about 30 persons took refuge in this particular shelter, it was designed to accommodate many more. Since it contained a well, the water supply was virtually unlimited. It was also supplied with electricity, plumbing, and cooking facilities.

The Kovno ghetto had several dozen melina (Brown and Levin, 1962). Many variants of melina were constructed in various ghettoes of Eastern Europe.

MELINA

REFERENCES

Brown, Z. A. and Levin, D. The Story of an Underground. Jerusalem: Yad Vashem, 1962.

Also included in the bibliography are the categories of concentration camps, shelter occupancy, and experimental data which were covered for background purposes. These sources of information have not been summarized in this report because of the extensive treatment they have recently received in other reviews of this nature.

THE MELINOT UNDER THE BLACKSMITH SHOP

(1) The chimney of the forge to ventilate the Melinot.

(2) Entrance to the Melinot through the forge.

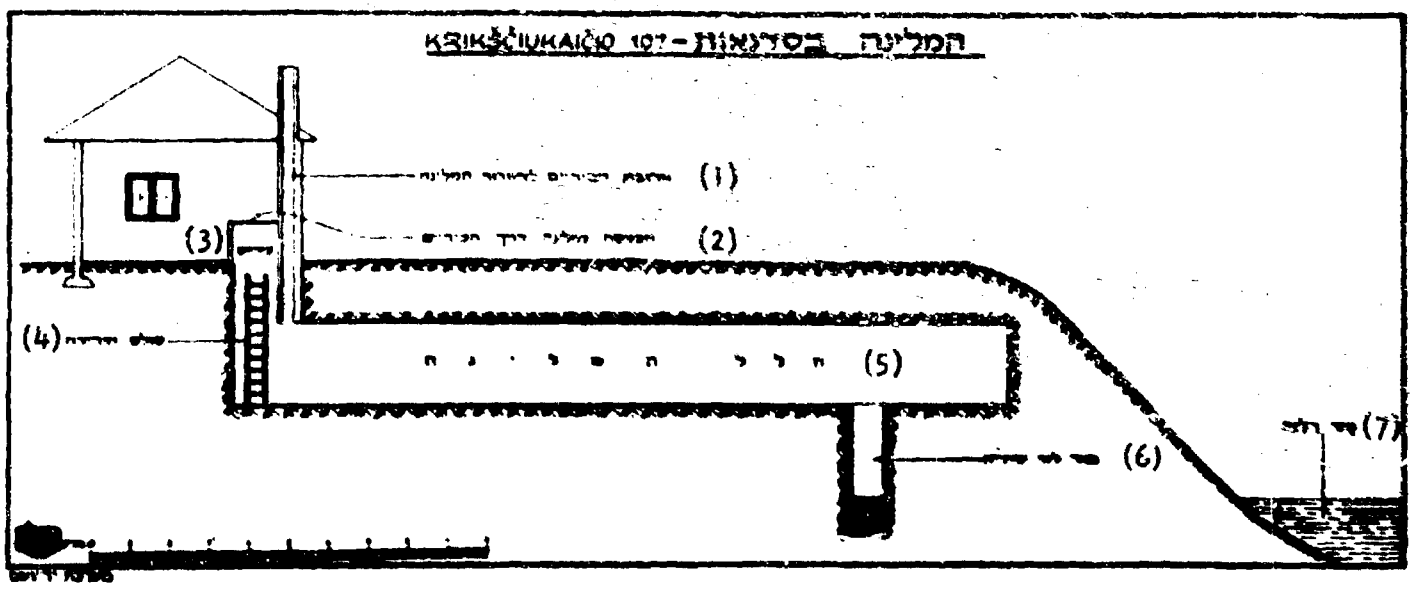
(3) Forge.

(4) Ladder for descending into the Melinot.

(5) The space of the Melinot.

(6) A well for drinking water.

(7) Vilija River.



"This drawing was produced . . . through the courtesy of the engineer, Zadok Avyatar (Bleiman) from Kovno, who is now in Haifa."

(Source: Brown, Z. A. and Levin, D., 1962, p. 66.)

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REFERENCES

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APPENDIX G

REVISED INDEX-GUIDE FOR REVIEW OF HISTORICAL LITERATURE ON CROWDING

APPENDIX G

REVISED INDEX-GUIDE FOR REVIEW OF HISTORICAL LITERATURE ON CROWDING

(McBee Card Number)

1. SOURCE

(T-0) 1.1 Type of source

(T-0-5) 1.1.1 Autobiographical - popular

(T-0-6) 1.1.2 Autobiographical - semipopular

(T-0-7) 1.1.3 Autobiographical - scholarly

(T-0-8) 1.1.4 Legal or administrative investigation - information from secondary sources

(T-0-9) 1.1.5 Legal or administrative investigation - information from primary sources

(T-0-10) 1.1.6 Scientific, empirical investigation

(T-0-11) 1.1.7 Scholarly, historical investigation

(T-0-12) 1.1.8 Bibliography

(T-0-13) 1.1.9 Review article

(T-0-8-6) 1.1.10 Political, religious, or social action group report

(T-0-9-6) 1.1.11 Semipopular - non-eyewitness account or discussion

(T-1) 1.2 Evaluation of pertinence of source to topic

(T-1-5) 1.2.1 High

(T-1-6) 1.2.2 Moderate

(T-1-7) 1.2.3 Low

(T-1-8) 1.2.4 None

(T-2) 1.3 Evaluation of accuracy and validity of source

(T-2-5) 1.3.1 High

(T-2-6) 1.3.2 Moderate

(T-2-7) 1.3.3 Low

(T-2-8) 1.3.4 None

(T-3) 1.4 Bias of source

(T-3-5) 1.4.1 Toward minimization of degree of stress in situation

(T-3-6) 1.4.2 Toward exaggeration of degree of stress in situation

(T-3-7) 1.4.3 Mixed

(T-3-8) 1.4.4 None evident

(T-3-9) 1.4.5 Special bias

2. TYPE OF EVENT

(T-14) 2.1 Transportation

(T-14-19) 2.1.1 Slave trade

(T-14-20) 2.1.2 Immigrants in steerage

(T-14-21) 2.1.3 Troop ships

(T-14-22) 2.1.4 Submarines

(T-14-23) 2.1.5 Shipwrecks

(T-14-24) 2.1.6 Convict resettlement

(T-14-25) 2.1.7 Coolie trade

(T-14-26) 2.1.8 Rail transports

(T-14-27) 2.1.9 Evacuations

(T-15) 2.2 Sheltering

(T-15-19) 2.2.1 Sieges; civil personnel

(T-15-20) 2.2.2 Air Raid shelters, World War II

(T-15-21) 2.2.3 Fortresses and bunkers; military personnel

(T-15-22) 2.2.4 Shelter occupancy studies

(T-16) 2.3 Land dwellings

(T-16-19) 2.3.1 Slums

(T-16-20) 2.3.2 Wintering-in

(T-16-21) 2.3.3 Arctic, Antarctic missions

(T-17) 2.4 Internment situations

(T-17-19) 2.4.1 POW camps

(T-17-20) 2.4.2 Concentration camps

(T-17-21) 2.4.3 Penal institutions

(T-17-22) 2.4.4 Mental institutions

(T-17-23) 2.4.5 Japanese relocation camps

(T-17-24) 2.4.6 Displaced Persons Camps

(T-17-25) 2.4.7 Miscellaneous episodes of high crowding

(T-18) 2.5 Natural disaster

(T-18-20) 2.5.1 Floods

(T-18-21) 2.5.2 Mine disasters

(T-18-22) 2.5.3 Tornadoes, storms

(T-18-23) 2.5.4 Other types of disasters

3. ENVIRONMENTAL FEATURE

(B-0)	3.1	Air
(B-0-9)	3.1.1	Oxygen insufficiency
(B-0-10)	3.1.2	CO_2 excess
(B-0-11)	3.1.3	Circulation
(B-0-12)	3.1.4	Ionization
(B-0-13)	3.1.5	Other noxious contamination
(B-1)	3.2	Food
(B-1-9)	3.2.1	Caloric insufficiency
(B-1-10)	3.2.2	Unpalatability
(B-1-11)	3.2.3	Indigestibility
(B-1-12)	3.2.4	Contamination
(B-1-13)	3.2.5	Nutritive imbalance
(B-1-9-10)	3.2.6	Distribution
(B-1-9-11)	3.2.7	Other
(B-2)	3.3	Space
(B-2-9)	3.3.1	Density - area
(B-2-10)	3.3.2	Density - cubic feet per person
(B-2-11)	3.3.3	Organization
(B-2-12)	3.3.4	Postural constraint
(B-2-13)	3.3.5	Sleep dimensions, schemes
(B-3)	3.4	Temperature
(B-3-9)	3.4.1	Range of air temperature (.1-wet bulb, .2-dry bulb)
(B-3-10)	3.4.2	Interferences with body regulation
(B-3-11)	3.4.3	Object contact as source of stress
(B-3-12)	3.4.4	Protections available

(B-4)	3.5	Drinking water
(B-4-9)	3.5.1	Availability
(B-4-10)	3.5.2	Contamination
(B-4-11)	3.5.3	Distribution
(B-5)	3.6	Sanitation and disease
(B-5-9)	3.6.1	Waste disposal
(B-5-10)	3.6.2	Hygiene facilities
(B-5-11)	3.6.3	Disease agents; infestation
(B-5-12)	3.6.4	General medical care
(B-5-13)	3.6.5	Wounds; pre-existing injuries
(B-5-9-10)	3.6.6	Wounds; injuries occurring in confinement
(B-5-9-11)	3.6.7	Special medical problems
(B-6)	3.7	Work demands
(B-6-9)	3.7.1	Individual activity - voluntary, adaptive
(B-6-10)	3.7.2	Group activity - voluntary, adaptive
(B-6-11)	3.7.3	Extraneous work demands (e.g. - work for captor)
(B-6-12)	3.7.4	Leisure activity
(B-7)	3.8	Social interaction
(B-7-9)	3.8.1	Violence - from external agent
(B-7-10)	3.8.2	Violence - among confined group
(B-7-11)	3.8.3	Degree of communication with outside world
(B-7-12)	3.8.4	Rumors
(B-7-13)	3.8.5	Privacy

(B-8) 3.9 Psychological and social traumata

(B-8-9) 3.9.1 Degradation

(B-8-10) 3.9.2 Uprooting from community

(B-8-11) 3.9.3 Family separation

(B-8-12) 3.9.4 Sleep deprivation

(B-8-13) 3.9.5 Light

(B-8-9-10) 3.9.6 Noise

4. DURATION AND CONTINUITY

(L-1) 4.1 Total length of event

(L-2) 4.2 Continuity (continuous vs. interrupted, intermittent)

(L-3) 4.3 Duration of specific stress

(L-3-6) 4.3.1 Uncertainty of duration

(L-4) 4.4 Initial impact of confinement

(L-5) 4.5 Availability of post-crisis data

5. POPULATION CHARACTERISTICS

(R-0) 5.1 Numbers involved

(R-0-4) 5.1.1 Single individual

(R-0-5) 5.1.2 Family group

(R-0-6) 5.1.3 Other small group (under 10)

(R-0-7) 5.1.4 10 - 30

(R-0-8) 5.1.5 30 - 100

(R-0-9) 5.1.6 100 - 500

(R-0-10) 5.1.7 500 - 1000

(R-0-4-5) 5.1.8 Over 1000

(R-1) 5.2 Age/Sex

(R-1-4) 5.2.1 Adult, male

(R-1-5) 5.2.2 Adult, female

(R-1-6) 5.2.3 Adult, mixed

(R-1-7) 5.2.4 Children

(R-1-8) 5.2.5 Adult female and children

(R-1-9) 5.2.6 All ages and sexes

(R-2) 5.3 Ethnicity

(R-2-4) 5.3.1 Race

(R-2-5) 5.3.2 Nationality

(R-2-6) 5.3.3 Religion

(R-2-7) 5.3.4 Homogeneity or heterogeneity of group involved

(R-3) 5.4 Condition of population prior to crowding situation

(R-3-4) 5.4.1 Previous knowledge of impending stressful experience

6. IMPACT

(B-14) 6.1 Individual/physiological

(B-14-19) 6.1.1 G - I

(B-14-20) 6.1.2 G - U

(B-14-21) 6.1.3 Neural

(B-14-22) 6.1.4 Muscular

(B-14-23) 6.1.5 Skeletal

(B-14-24) 6.1.6 Dermal

(B-14-25) 6.1.7 Respiratory

(B-14-26) 6.1.8 Other

(B-15)	6.2 Individual/psychological
(B-15-19)	6.2.1 Perceptual and cognitive
(B-15-20)	6.2.2 Normative
(B-15-21)	6.2.3 Motivational level
(B-15-22)	6.2.4 Integration
(B-15-23)	6.2.5 Deprivational or traumatic impact
(B-15-24)	6.2.6 Indulgent or adaptive impact
(B-16)	6.3 Groups
(B-16-19)	6.3.1 Affective solidarity
(B-16-20)	6.3.2 Normative controls
(B-16-21)	6.3.3 Group/family disorganization
(B-16-22)	6.3.4 Leadership, organization, and internal communication
(B-16-23)	6.3.5 Out-group relations
(B-16-24)	6.3.6 Material well-being
(B-16-25)	6.3.7 Between-group comparisons
(B-16-26)	6.3.8 Subgroup/family structure
(B-16-27)	6.3.9 General morale
(B-17)	6.4 Mortality rate
(B-17-19)	6.4.1 Less than 15 percent
(B-17-20)	6.4.2 15 - 50 percent
(B-17-21)	6.4.3 Over 50 percent
(B-17-22)	6.4.4 Unspecified
(B-18)	6.5 Morbidity rate
(B-18-19)	6.5.1 Less than 15 percent
(B-18-20)	6.5.2 15 - 50 percent
(B-18-21)	6.5.3 Over 50 percent
(B-18-22)	6.5.4 Unspecified